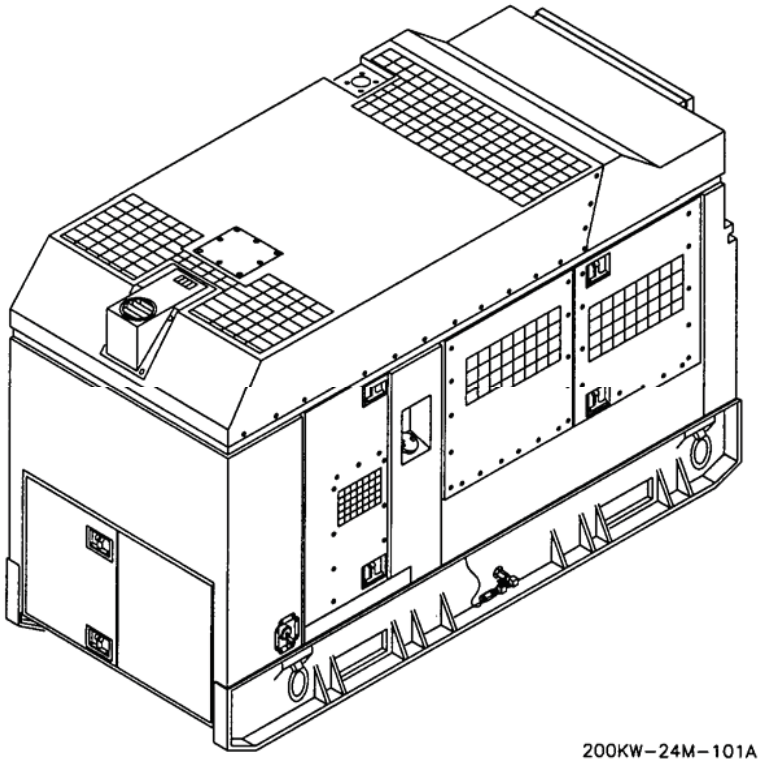
ARMY TM 9-6115-730-24
AIR FORCE TO 35C2-3-520-2
MARINE CORPS TM 11598A-OI
NAVAIR 19-50-29

TECHNICAL MANUAL

FIELD AND SUSTAINMENT MAINTENANCE FOR

GENERATOR SET, SKID MOUNTED, TACTICAL QUIET 200 kW, 50/60 Hz, MEP-809A NSN 6115-01-296-1462 (EIC: VK7)

GENERATOR SET, TRAILER MOUNTED, TACTICAL QUIET 200 kW, 50/60 Hz, PU-809A NSN 6115-01-471-7085 (EIC: TBS)



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NAVAIR STATEMENT - Published by Direction of Commander, Naval Air Systems Command

HEADQUARTERS, DEPARTMENT OF THE ARMY, AIR FORCE, NAVY, AND HEADQUARTERS U.S. MARINE CORPS

1 OCTOBER 2006

PCN 184 115981 00

WARNING SUMMARY

This warning summary contains general safety warnings and hazardous materials warnings that must be understood and applied during operation and maintenance of this equipment. Failure to observe these precautions could result in serious injury or death to personnel. Also included are explanations of safety and hazardous material icons used within the technical manual.

FIRST AID

For first aid, refer to FM 4-25.11.

5 SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK

1 DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL

2 IF POSSIBLE, TURN OFF THE ELECTRICAL POWER

3 IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH, OR LIFT THE PERSON TO SAFETY USING A DRY WOODEN POLE OR A DRY ROPE OR SOME OTHER INSULATING MATERIAL

4 SEND FOR HELP AS SOON AS POSSIBLE

5 AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESUSCITATION

200KW-24M-120

WARNING SUMMARY - Continued

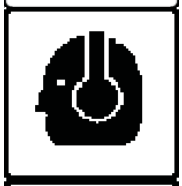
SAFETY AND HAZARDOUS MATERIAL

This manual describes physical and chemical processes that may require the use of chemicals, solvents, paints, or other commercially available material. Users of the manual should obtain the material safety data sheets (Occupational Safety and Health Act (OSHA) Form 20 or equivalent) from the manufacturers or suppliers of materials to be used. Users must be completely familiar with manufacturer/supplier information and adhere to their procedures, recommendations, warnings, and cautions for safe use, handling, storage, and disposal of these materials.

EXPLANATION OF SAFETY WARNING ICONS

ELECTRICAL - electrical wire to hand with electricity symbol running through hand shows that shock hazard exists.

HOT AREA - hand over object radiating heat shows that part or area is hot and can burn.



EAR PROTECTION - headphones over ears shows that noise level will harm ears.

HEAVY OBJECT - human figure stooping over heavy object shows physical injury potential from improper lifting technique or failure to share lifting task with other persons.

HEAVY PARTS - hand with heavy object on top shows that heavy parts can crush and harm if dropped.

HEAVY PARTS - foot with heavy object on top shows that heavy parts can crush and harm if dropped

WARNING SUMMARY - Continued

EXPLANATION OF SAFETY WARNING ICONS - Continued

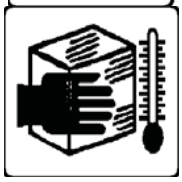
MOVING PARTS - hand with figures caught between gears shows that the moving parts of the equipment present a danger to life or limb.

SHARP OBJECT - pointed object in hand shows that a sharp object presents a danger to limb.

HEAVY OBJECT - falling object shows that a heavy item can fall and crush.

EXPLOSION - flame and burst shows that material can explode if subjected to high temperatures, sources of ignition, or high pressure.

EYE PROTECTION - human figure with goggles shows that material can injure eyes.



CRYOGENIC - hand in block of ice shows that the material is extremely cold and can injure human skin or tissue.

WARNING SUMMARY - Continued

GENERAL SAFETY WARNINGS DESCRIPTION

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

WARNING

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

WARNING

High voltage is produced when the generator set is in operation. Never attempt to connect or disconnect load cables while the generator set is running. Failure to comply can cause injury or death to personnel.

WARNING

If necessary to move a generator set which has been operating in parallel with another generator set, shut down both generator sets prior to removing load cables or ground. Failure to comply can cause injury or death to personnel by electrocution.

WARNING

Before making any connections for parallel operation or moving generator set which has been operating in parallel, ensure there is no input to the load output terminal board and the generator sets are shut down. Failure to comply can cause injury or death to personnel by electrocution.

WARNING SUMMARY - Continued

GENERAL SAFETY WARNINGS DESCRIPTION - Continued

WARNING

High voltage power is available when the main contactor is closed. Avoid accidental contact with live components. Ensure load cables are properly connected and the load cable door is shut before closing main contactor. Ensure load is turned off before closing main contactor. Ensure that soldiers working with/on loads connected to the generator set are aware that main contactor is about to be closed before closing main contactor. Failure to observe this warning can result in severe personal injury or death by electrocution.

WARNING

A qualified technician must make the power connections and perform all continuity checks. The power source may be a generator or commercial power. Failure to comply with this warning can result in injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

WARNING

Slave receptacle (NATO connector) is electrically live at all times and is unfused. The Battery Disconnect Switch does not remove power from the slave receptacle. NATO slave receptacle has 24 VDC even when Battery Disconnect Switch is set to OFF. This circuit is only dead when the batteries are fully disconnected. Disconnect batteries before performing maintenance on the slave receptacle. Failure to comply can cause injury or death to personnel.

WARNING

Ensure power is off before performing troubleshooting procedures. Failure to comply can cause injury to personnel.

WARNING

A strong electrical shock hazard is present if the electrical power is not removed from the ECM. The electronic unit injector system uses 90-120 volts.

WARNING

Ensure that the engine cannot be started while maintenance is being performed. (ENGINE CONTROL switch set to OFF/RESET. Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF.) Failure to comply can cause injury or death to personnel.

WARNING SUMMARY - Continued

GENERAL SAFETY WARNINGS DESCRIPTION - Continued

WARNING

Lethal voltages up to 440 Vac are present on wiring any time the generator set is operating or paralleled with other generator sets that are operating. Be very careful when working around these wires and making measurements during troubleshooting. Failure to comply can cause serious injury or death to personnel.

WARNING

High voltages may be present at the generator terminals when the unit is rotating. Tools, equipment, clothing, and your body must be kept clear of rotating parts and electrical connections. Special precautions must be taken during troubleshooting since protective covers and safety devices may be removed or disabled to gain access and perform tests. Be extremely careful. Failure to comply can cause serious injury or death to personnel.

WARNING

Dangerously high voltage can exist across current transformer (CT) output with engine running. CT could explode if disconnected from load with engine running. Do not disconnect CT with generator rotating. Failure to comply can cause serious injury or death to personnel.

WARNING

When disconnecting or removing batteries, disconnect the negative lead that connects directly to the grounding stud first; disconnect the negative end of the interconnection cable next. When installing batteries, reverse the connection sequence. Failure to comply can cause serious injury to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set, and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply can cause injury or death to personnel.

WARNING

Exhaust system can get very hot. Shut down generator set, and allow system to cool before performing checks, services and maintenance. Failure to comply can cause severe burns and injury or death to personnel.

WARNING SUMMARY - Continued

GENERAL SAFETY WARNINGS DESCRIPTION - Continued

WARNING

The muffler blanket heat insulation material can cause skin and eye irritation and deteriorate after continued use. Avoid breathing and eye and skin contact with the insulation particles. Wear dust mask, safety goggles, gloves and long sleeve clothes when working on muffler blanket. Failure to comply can cause injury to personnel.

WARNING

Top housing panels can get very hot. Allow panels to cool down before performing maintenance. Failure to comply can cause injury or death to personnel.

WARNING

When running, winterization heater has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow heater to cool before performing maintenance. Wear gloves and additional protective clothing as required. Failure to comply can cause injury or death to personnel.

WARNING

Wear heat resistant gloves and avoid contacting hot metal surfaces with your hands after components have been heated. Wear additional protective clothing as required. Failure to comply can cause injury to personnel.

WARNING

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/or liquids can result in burns and scalding. Shut down generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply can cause injury or death to personnel.

WARNING

In extreme cold weather, skin can stick to metal. Avoid contacting metal items with bare skin in extreme cold weather. Failure to comply can cause injury or death to personnel.

WARNING

Operating the generator set exposes personnel to a high noise level. Hearing protection must be worn when operating or working near the generator set when the generator set is running. Failure to comply can cause hearing damage to personnel.

WARNING

Many components require a two-person lift. Lifting heavy components can cause back strain. Ensure proper lifting techniques are used when lifting heavy components. Failure to comply can cause injury to personnel.

WARNING SUMMARY - Continued

GENERAL SAFETY WARNINGS DESCRIPTION - Continued

WARNING

Each battery weighs more than 70 pounds (32 kg) and requires a two-person lift. Lifting batteries can cause back strain. Ensure proper lifting techniques are used when lifting batteries. Failure to comply can cause injury to personnel.

WARNING

Flywheel weighs more than 125 pounds (57 kg) and requires a two-person lift. Lifting flywheel can cause back strain. Ensure proper lifting techniques are used when lifting flywheel. Failure to comply can cause injury to personnel.

WARNING

The generator set, engine, and generator are extremely heavy and require an assistant and a lifting device (forklift, overhead lifting device) with sufficient capacity. Failure to comply can cause serious injury or death to personnel.

WARNING

Be extremely careful when working near the generator set as it is being positioned on the trailer. Failure to comply can cause injury to personnel.

WARNING

Support components when removing attaching hardware or component may fall. Failure to comply can cause injury to personnel and equipment damage.

WARNING

Retaining rings and springs are under tension and can act as projectiles when being removed. Use eye protection when removing retaining rings or springs. Failure to comply can cause injury to personnel.

WARNING

Oil filter base and housing springs are under tension and can act as projectiles when being removed. Use eye protection when removing springs. Failure to comply can cause injury to personnel.

WARNING

Do not use the engine starter to turn the flywheel. Failure to comply can cause injury to personnel.

WARNING

Fan has sharp blades. Use caution and wear gloves when removing or installing belts. Failure to comply can cause injury to personnel.

WARNING SUMMARY - Continued

EXPLANATION OF HAZARDOUS MATERIALS ICONS

EYE PROTECTION - human figure with goggles shows that material can cause injury to eyes.

CHEMICAL - drops of liquid on hand shows that material can cause burns or irritation to human skin or tissue.

VAPOR - human figure in a cloud shows that material vapors present danger to life or possible death.

FIRE - flames show that material is flammable.

EXPLOSION - flame and burst shows that material can explode if subjected to high temperatures, sources of ignition, or high pressure.

RADIATOR - steam in face and body shows that escaping steam and hot water exist.

WARNING SUMMARY - Continued

HAZARDOUS MATERIALS DESCRIPTION

WARNING

Batteries give off a flammable gas. Do not smoke or use open flame when performing maintenance. Failure to comply can cause injury or death to personnel and equipment damage due to flames and explosion.

WARNING

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard which may result in injury or death. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere.

WARNING

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Personnel are to wash exposed skin and change chemical soaked clothing promptly if exposed to fuel. Failure to comply can cause injury or death to personnel.

WARNING

Cleaning solvent is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with cleaning solvent. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply can cause injury or death to personnel.

WARNING

Carbon removing compound is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with carbon removing compound. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply can cause injury or death to personnel.

WARNING

Fuels used in the generator set are flammable. Do not smoke or use open flames when performing maintenance. Failure to comply can result in flames and possible explosion and can cause injury or death to personnel and damage to the generator set.

WARNING

Fuels used in the generator set are flammable. When filling the fuel tank, maintain metal-to-metal contact between filler nozzle and fuel tank opening to eliminate static electrical discharge. Failure to comply can result in flames and possible explosion and cause injury or death to personnel and damage to the generator set.

WARNING SUMMARY - Continued

HAZARDOUS MATERIALS DESCRIPTION - Continued

WARNING

Hot exhaust gases can ignite flammable materials. Allow room for safe discharge of hot gases and sparks. Failure to comply can cause injury or death to personnel.

WARNING

High pressure steam can blow particles or chemicals into eyes, can cause severe burns, and creates hazardous noise levels. Wear protective eye, skin, and hearing protection when using high pressure steam. Failure to comply can cause serious injury to personnel.

WARNING

Eye protection is required when working with compressed air. Compressed air can propel particles at high velocity and injure eyes. Do not exceed 15 psi pressure when using compressed air. Failure to comply could cause serious injury to personnel.

WARNING

Cleaning compound is toxic. Avoid prolonged breathing of vapors. Use only in a well-ventilated area. Failure to comply can cause serious injury to personnel.

WARNING

Breathing ether fumes can cause fainting. Do not manually discharge or deliberately inhale ether. Failure to comply can cause injury to personnel.

WARNING

Avoid breathing fumes generated by soldering. Eye protection is required. Good general ventilation is normally adequate. Failure to comply can cause injury to personnel.

WARNING

CARC paint is a health hazard, and is irritating to eyes, skin, and respiratory system. Wear protective eyewear, mask, and gloves when applying or removing CARC paint. Failure to comply can cause injury to personnel.

WARNING SUMMARY - Continued

HAZARDOUS MATERIALS DESCRIPTION - Continued

WARNING

Exhaust discharge contains deadly gases including carbon monoxide. Do not operate generator set in an enclosed area unless exhaust discharge is properly vented outside. Failure to comply can cause injury or death to personnel.

Engine exhaust fumes contain deadly poisonous gases.

Severe exposure can cause death or permanent brain damage.

Exhaust gases are most dangerous in places with poor airflow. Best defense against exhaust gas poisoning is very good airflow.

To protect yourself and your partners, always obey the following rules:

- DO NOT run engine indoors unless you have VERY GOOD AIRFLOW.
- DO NOT idle engine for a long time unless there is VERY GOOD AIRFLOW.
- Be alert at all times. Check for smell of exhaust fumes.
- REMEMBER: Best defense against exhaust gas poisoning is VERY GOOD AIRFLOW.
- Exhaust gas poisoning causes dizziness, headache, loss of muscle control, sleepiness, coma, and death. If anyone shows signs of exhaust gas poisoning, get ALL PERSONNEL clear of HMEE. Make sure they have lots of fresh air. KEEP THEM WARM, CALM, AND INACTIVE. GET MEDICAL HELP. If anyone stops breathing, give artificial respiration. See FM 4-25.11 for first aid.

Change NO. 1

HEADQUARTERS
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MARINE CORPS
Washington, DC, 31 July 2009

TECHNICAL MANUAL

FIELD AND SUSTAINMENT MAINTENANCE FOR GENERATOR SET, SKID MOUNTED, TACTICAL QUIET 200 kW, 50/60 Hz, MEP-809A NSN 6115-01-296-1462 (EIC: VK7) GENERATOR SET, TRAILER MOUNTED, TACTICAL QUIET 200 kW, 50/60 Hz, PU-809A NSN 6115-01-471-7085 (EIC: TBS)

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TM-9-6115-730-24, dated 1 October 2006, is updated as follows:

1. File this sheet in front of the manual for reference.
2. This change is the result of adding Engineering Change Proposals (ECPs)
3. New or updated text is indicated by a vertical bar in the outer margin of the page. New or updated illustrations are indicated by a vertical bar in the outer margin of the page or by a miniature pointing hand.
4. Remove old pages and insert new pages as indicated below:

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Index 1 through 4	Index 1 through 4

5. Replace the following work packages with their revised version.

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WP 0096

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WP 0125

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Dates of issue for the original manual are:

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Change .. 1 .. 31 July 2009

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Washington, D.C., 1 OCTOBER 2006**

TECHNICAL MANUAL

FIELD AND SUSTAINMENT MAINTENANCE FOR

GENERATOR SET, SKID MOUNTED, TACTICAL QUIET 200 kW, 50/60 Hz, MEP-809A NSN 6115-01-296-1462 (EIC:VK7)

GENERATOR SET, TRAILER MOUNTED, TACTICAL QUIET 200 kW, 50/60 Hz, PU-809A NSN 6115-01-471-7085 (EIC:TBS)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes, or if you know of a way to improve the procedures, please let us know. Reports, as applicable by the requiring Service, should be submitted as follows:

(a) (A) Army - Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) located in the back of this manual, directly to: Commander, U.S. Army CECOM Life Cycle Management Command (LCMC) and Fort Monmouth, ATTN: AMSEL-LC-LEO-E-CM, Fort Monmouth, NJ 07703-5006. You may also send in your recommended changes via electronic mail or by fax. Our fax number is 732-532-1556, DSN 992-1556. Our e-mail address is MONM-AMSELLEOPUBSCHG@conus.army.mil. Our online web address for entering and submitting DA Form 2028s is http://edm.monmouth.army.mil/pubs/2028.html.

(b) (MC) Marine Corps - Submit notice of discrepancies or suggest changes on a NAVMC 10772. The NAVMC may be submitted via the Internet using website https://www.ala.usmc.mil, click on Publications, Technical Publications, follow the instructions, and then click on NAVMC 10772. It may also be submitted by electronic mail to smb.log.tech.pubs.fct@usmc.mil, or by mailing a paper copy NAVMC 10772 in an envelope addressed to Commander, Marine Corps Systems Command, ATTN: Assistant Commander Acquisition and Logistics (AC LCL/TP), 814 Radford Blvd, Suite 20343, Albany, Georgia 31704-0343. In addition, forward an information copy to the Project Officer at the following address: Commander, Marine Corps Systems Command (GTES-EPS), 2200 Lester Street, Quantico, VA 22134-6050.

(c) (N) Navy - By letter directly to Commander, Space and Naval Warfare Systems Command, ATTN: SPAWAR 8122, Washington, DC 20363-5100.

(d) (F) Air Force - By Air Force AFTO Form 22 (Technical Manual (TM) Change Recommendation and Reply) in accordance with paragraph 6-5, Section VI, TO 00-5-1 directly to prime ALC/MST.

A reply will be furnished to you.

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Glossary

Index

HOW TO USE THIS MANUAL

This manual contains maintenance instructions for the 200 kW Tactical Quiet Generator (TQG) Skid-Mounted MEP-809A and for the TQG, Trailer-Mounted PU-809A. The skid-mounted TQG can be mounted on a 5-ton trailer, Model XM1061E1 and is designated PU-809A in that configuration. Detailed operation and maintenance for the trailer can be found in TM 9-2330-376-14&P.

This maintenance manual is part of a family of manuals which includes an Operator's Manual (TM 9-6115-730-10) and a Repair Parts and Special Tools Lists (RPSTL) Manual (TM 9-6115-730-24P).

Refer to References work package WP 0121, located in Chapter 7, for a listing of other related manuals.

This manual implements the Army Maintenance Transformation and changes the Maintenance Allocation Chart (MAC) to support Field and Sustainment Maintenance under the new two-level maintenance concept.

This manual is written in Work Package (WP) format.

Table of Contents: The table of contents will help you understand the organization of the manual. The overall table of contents in the front of the manual directs you to the Chapters and lists all of the work packages in the manual with tables and figures identified for each work package. The chapters contain descriptive information, maintenance procedures organized by maintenance level, and supporting data. Each chapter contains its own chapter index that lists all the work packages within the chapter to help you find information. Each chapter is divided into work packages with titles that describe the information or procedure in the work package. An alphabetical index at the end of the manual can also be used to find work packages.

NOTE

The generator end of the TQG is referred to as the REAR of the TQG. The control panel is also located on the generator end (REAR) of the TQG. Figure 1 (Sheets 1-6) in WP 0002 shows where TQG components are located.

GENERAL INFORMATION AND EQUIPMENT DATA WORK PACKAGES

Chapter 1 contains general information work packages including required maintenance forms, records, and reports; safety, care, and handling information and directions for finding warranty information. General information includes a list of abbreviations and acronyms. Other WPs in the chapter describe the equipment, and include location of major components, theory of operation, and equipment data.

FIELD LEVEL TROUBLESHOOTING WORK PACKAGES

Chapter 2 Field Level Troubleshooting Work Packages contains Field Level Troubleshooting work packages.

The TQG features electronic troubleshooting that allows you to diagnose problems with the engine and generator by using special indicators and code readouts displayed on the Electronic Modular Control Panel (EMCP).

Before you begin troubleshooting, read the introduction to troubleshooting WP 0004 carefully and familiarize yourself with the operation and meaning of the codes and indicators. You should also use the Operator Manual, TM 9-6115-730-10, so you know how controls and indicators work.

WP 0004 contains an overview of the troubleshooting that tells how the Generator Set Control (GSC) indicator lights and Alarm Module lights work and describes the use of Component Identification (CID) codes and Failure Mode Identifier (FMI). It contains directions for viewing the fault log of recorded controller and engine control module (ECM) faults and engine event codes. The WP also explains the use of the Digital Voltage Regulator (DVR) failure codes and indicators.

HOW TO USE THIS MANUAL - Continued

WP 0005 contains a Field level troubleshooting index. This index is followed by the troubleshooting procedures in a series of related WPs.

WP 0006 contains troubleshooting procedures to be followed for dedicated GSC shutdown indicator lights.

WP 0007 contains troubleshooting procedures for SP Fault Codes.

WP 0008 contains troubleshooting procedures for AL Fault Codes.

WP 0009 contains troubleshooting procedures for GSC Fault Codes based on generator set and engine monitoring electronics for identify operating problems. These procedures contain all the CID FMI fault code combinations that you will see displayed on the GSC display and directs you to the appropriate fault isolation procedure.

WP 0010 contains troubleshooting procedures DVR Fault Codes.

WP 0011 contains troubleshooting for generator set failures without fault codes.

WP 0012 tells you how to prepare the TQG for use with the Maintenance Support Device (MSD), if available, for using Caterpillar Electronics Technician (Cat ET) engine diagnostic software. A laptop or SPORT running with MS Windows 2000 or higher can also be used. The WP describes how to load all software required for proper operation of diagnostics software on your computer in a logical sequence. This includes the software for Caterpillar Communications Adapter II that you must preload on your computer before using the diagnostics software. It also includes instructions for loading the ET software and other necessary instructions or documentation onto your computer.

WP 0012 also contains instructions required for obtaining software license for the Cat ET tool and maintaining the assigned registration number for the ET tool license. It also includes instructions for loading the ET software and other necessary documentation onto your computer.

WP 0013 contains troubleshooting procedures using the Cat ET tool for Field level troubleshooting.

Before using the MSD and the Cat ET, software for Caterpillar Communication Adapter II should also be preloaded as described in WP 0012. Refer to Caterpillar Service Tool Hardware and Software/User's Manual Communication Adapter II, Ver 1.93 (1.9-B4) and CD NEHS0758.

UNIT (FIELD) LEVEL MAINTENANCE WORK PACKAGES

Chapter 3 Unit (Field) Level Maintenance Instructions contains Unit (Field) Level Maintenance Instructions work packages for the Generator Set.

Read the INITIAL SETUP section of each maintenance work package carefully before you start any maintenance procedure. Get the tools and supplies listed and the personnel needed.

Chapter 4 Unit (Field) Level Troubleshooting Work Packages for Winterization Kit contains Unit (Field) Level Troubleshooting work packages for the optional winterization kit installation.

HOW TO USE THIS MANUAL - Continued

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE WORK PACKAGES

Chapter 5 Direct Support (Field) Level Maintenance Instructions contains Direct Support (Field) Level Maintenance Instructions work packages for the Generator Set.

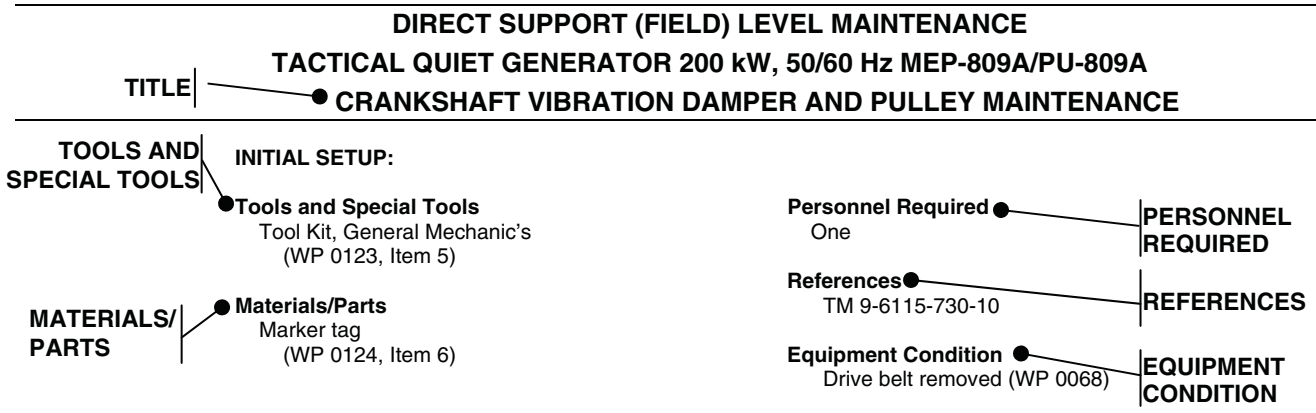
Read the INITIAL SETUP section of each maintenance work package carefully before you start any maintenance procedure. Get the tools and supplies listed and the personnel needed.

Chapter 6 General Support Level Maintenance Instructions. These instructions have been moved to Sustainment (NMWR) in accordance with Implementation of Two Level Maintenance.

Chapter 7 contains Supporting Information, including References WP, Introduction and Two-Level MAC work packages, Expendable and Durable Items List WP, Tool Identification List WP, Mandatory Replacement Parts WP, and any additional support items WPs.

Rear Matter. At the rear of your manual, you will find a Glossary, Alphabetical Index, Foldout schematics, DA Form 2028s.

While performing the procedures in this manual, you may find that you are able to make suggestions that will improve the manual. At the back of this manual, you will find copies of DA Form 2028 that invite you to submit your suggestions.



LEGEND:

TITLE	The name of the procedure.
TOOLS AND SPECIAL TOOLS	The tools and equipment needed to do the procedures.
MATERIALS/PARTS	The supplies and parts needed to do the procedures.
PERSONNEL REQUIRED	The personnel needed to do the procedures.
REFERENCES	Other work packages, manuals, and publications needed to do the procedure.
EQUIPMENT CONDITION	Special equipment condition(s) or procedures to be performed before starting the procedure.

CHAPTER 1

GENERAL INFORMATION, EQUIPMENT DESCRIPTION AND THEORY OF OPERATION

CHAPTER 1

FIELD AND SUSTAINMENT MAINTENANCE
GENERAL INFORMATION, EQUIPMENT DESCRIPTION AND THEORY OF OPERATION

WORK PACKAGE INDEX

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THEORY OF OPERATION	0003

FIELD AND SUSTAINMENT MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
GENERAL INFORMATION

SCOPE

This technical manual (TM) contains instructions for Unit and Direct Support (Field), General Support (Sustainment), Preventive Maintenance Checks and Service (PMCS), maintenance, checks and adjustments, theory of operation, troubleshooting, and corrective maintenance for the 200 kW Tactical Quiet Generator Set, MEP-809A and PU-809A.

Type of Manual: Field and Sustainment Maintenance.

Model Number and Equipment Name: Generator Set, Tactical Quiet, Skid Mounted, 200 kW, 50/60 Hz, MEP-809A.

Purpose of Equipment: The 200 kW TQG provides 120/208 Vac or 240/416 Vac, 50/60 Hz, 3-phase power for a wide variety of military applications, offering the mobility and operational characteristics demanded by modern armed forces. Operational characteristics include the ability to operate at all possible humidity levels, at ambient temperature levels from -25°F to +120°F (-32°C to +49°C) down to -50°F (-46°C) with winterization kit, and at altitudes up to 10,000 feet.

CONSOLIDATED INDEX OF ARMY PUBLICATIONS AND BLANK FORMS

Refer to the latest issue of DA PAM 25-30 to determine whether there are new additions, changes, or additional publications pertaining to the equipment.

MAINTENANCE FORMS, RECORDS, AND REPORTS

a. Army Reports of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, as contained in the current Maintenance Management Update (The Army Maintenance Management System (TAMMS). Fill out and forward to the TAMMS clerk, DD Form 5988-E, automated form in the Unit Level Logistics System (ULLS), generated Equipment Maintenance and Inspection Worksheet.

   Air Force Personnel will use AFR 66-1 for maintenance reporting and TO 00-35D-54 for unsatisfactory equipment reporting.

b. Reporting of Item and Packaging Discrepancies. Army and Air Force users fill out and forward SF 364 (Supply Discrepancy Report (SDR)) as prescribed in AR 735-11-2/DLAR 4140.55/SECNAVINST 4355.18/AFR 400-54/MCO 4430.3J.

c. Transportation Discrepancy Report (TDR) (SF 361). Army users fill out and forward Transportation Discrepancy Report (TDR) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33C/AFR 75-18/MCO P4610.19D/DLAR 4500.15.

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your 200 kW Tactical Quiet Generator Set needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF Form 368, Product Quality Deficiency Report (PQDR). EIRs should be mailed directly to:

Commander
U.S. Army Communications and Electronics Life Cycle Management Command
ATTN: AMSEL-LC-LEO-D-E-ED
Fort Monmouth, New Jersey 07703-5000

EQUIPMENT DEFICIENCY REPORTING

USAF Deficiency Reporting and Investigating System, TO 00-35D-54, Appendix A procedures will be used for electronic submission. Submit mailed SF 368 forms to:

Warner-Robins AFB
WRALC/LGMTC
375 Perry Street
Robins, AFB GA 31098-1865

A reply will be furnished to you.

CORROSION PREVENTION AND CONTROL (CPC)

CPC of materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future systems. While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials, such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these materials may be a corrosion problem. If a corrosion problem is identified, it can be reported using Standard Form 368, Product Quality Deficiency Report. Use of key words such as “corrosion,” “rust,” “deterioration,” or “cracking” will ensure that the information is identified as a CPC problem. The form should be submitted to the address specified in DA PAM 738-750. Air Force personnel will use TO 25-1-3.

DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE

Refer to TM 750-244-2 for demolition procedures when equipment destruction is required.

PREPARATION FOR STORAGE OR SHIPMENT

Requirements for packaging and administrative storage are contained in TM 9-6115-730-10. Requirements for short and long term storage are in WP 0085.

WARRANTY INFORMATION

This section provides information of manufacturer's warranties for generator set components. See Table 1 for list of warranted components (this work package).

NOTE

Check the Insp Date on the end-item data plate on the generator set. If the Insp Date is prior to 09/06, the (12) month Warranty period shall begin on 08/31/06.

If the Insp Date on the data plate is 09/06 or after, the standard (12) month Warranty begins on the date stamped.

Warranty service may be obtained through two methods.

1. a. (ARMY ONLY) Fill out the preferred warranty claim SF 368, Product Quality Deficiency Report, or fill out a warranty claim per DA PAM 738-750. The DA Form 2407, Maintenance Request, is also acceptable. Mail completed form to Commander, US Army, Communications-Electronics Command, ATTN: AMSEL-LC-CCS-G-GN, 1200 Nealis Avenue, Fort Monmouth, New Jersey 07703-5043. At a minimum, the end item NSN, serial number, and date of shipment to the government, and the defective component part number/CAGE must be included in the documentation.

   b. (OTHER SERVICES) TBD

2. Warranty service can be obtained by contacting the actual warranted component manufacturer listed in column 1. Each manufacturer will provide instructions on filing the claim.

3. Troubleshooting should be performed to the level of warranted component, but no further unless directed by the warranted component manufacturer. Troubleshooting to the failed part inside warranted components may invalidate the warranty.

4. There are some components with short warranty periods that may not be listed in Table 1. Warranty coverage may be available for these components. Submit warranty claims in accordance with DA PAM 738-750 to determine if the components are covered.

5. If you have difficulty with or questions about the warranty process, contact your local CECOM LAR or the CECOM Generator Branch, DSN 992-1313, (732) 532-1313.

MANUFACTURER WARRANTY INFORMATION

Column (1) – MANUFACTURER. This column gives you the name and address of the manufacturer of a component under warranty. Telephone numbers, fax numbers, and internet addresses are listed where available.

Column (2) – COMPONENT UNDER WARRANTY. This column describes the component under warranty with part number (PN) and vendor part number VPN where available.

Column (3) –WARRANTY PERIOD. This column lists the length of the warranty period.

Table 1. Manufacturer's Warranties for 200 kW Generator Set.

(1) MANUFACTURER	(2) COMPONENT UNDER WARRANTY	(3) WARRANTY PERIOD
Caterpillar, Inc Defense Products Engine Service Engineer PO Box 470 Mossville, IL 61552-0470 Phone: 309-578-4562 Fax: 309-578-3739 CAGE: 11083	Diesel Engine (PN: 0116-2110, VPN: 212-3802) <u>Digital Control System Components</u> GSC+P Controller (PN: 0116-1201-41, VPN: 198-9253) Alarm Module (PN: 0116-1201-34, VPN: 130-3324)	12 Months
Caterpillar, Inc. – Continued Warranty repairs can also be obtained through any Caterpillar dealer. Nearest dealer can be located at www.cat.com	Digital Voltage Regulator (PN: 0116-1201-37, VPN: 155-3832) Load Sharing Module (PN: 0116-1201-39, VPN: 161-0797) Transformer (PN: 0116-1201-32, VPN: 118-0175) Transformer (PN: 0116-1201-40, VPN: 169-4701) Harness Assembly (PN: 0116-1201-43, VPN: 212-8737)	
Marathon Electric P.O. Box 8003 Wausau, WI 54402-8003 Phone: 715-675-8237	Generator (PN: 0116-2120, VPN: 571PSL4800)	12 months from date of startup or 18 months from date of shipment whichever period shall expire first.

Table 1. Manufacturer's Warranties for 200 kW Generator Set - Continued.

(1) MANUFACTURER	(2) COMPONENT UNDER WARRANTY	(3) WARRANTY PERIOD
Signal Transformer 500 Bayview Avenue Inwood, NY 11096-1792 Phone: 516-239-5777	Transformer 1250 VA (PN: 0116-1257, VPN: HP1-12)	12 Months
Derema Group 46 Acorn Drive Westbrook, CT 06498 Phone 860-399-5669	Switch, Battery Disconnect (PN: 0116-1298, VPN: 2304-A)	12 Months
Madison Company 27 Business Park Drive Branford, CT 06405 Phone: 203-488-4477	Fuel Level Switch (PN: 0116-2304, VPN: M3863)	12 Months
Technology Research Co 140th Avenue North Clearwater, FL 33760 Phone: 727-535-0572 Rwood@TRCI.net	Relay, Overload/Short Circuit (PN: 0116-1219, VPN: 19970)	12 Months
G & O Manufacturing Co. 100 Gando Drive New Haven, CT 60513 Phone: 601-366-1423	Radiator Assembly (PN: 0116-2400, VPN: X6635-00-50)	18 months from shipment or 12 months in service
Parker Hannifin Corporation Racor Division Phone: 209-575-7651 hbrizuela@parker.com	Filter, Crankcase Ventilation (PN: 0116-1607-02, VPN: CCV6000-08L)	12 Months
Donaldson Company, Inc. Minneapolis, MN 55440-1299 Phone: 800-374-1374 www.donaldson-filters.com	Muffler, Exhaust (PN: 0116-2500, VPN: WOM12-0744) Air Cleaner Assembly (PN: 0116-2600, VPN: FVG16-0587)	36 Months 12 Months

NOMENCLATURE CROSS REFERENCE LIST

See TM 9-6115-730-24 for nomenclature for common names listed alphabetically with a cross-reference to the official nomenclature (i.e., Maintenance Allocation Chart (MAC), Repair Parts and Special Tools Lists (RPSTL)).

Common Name	Official Nomenclature
200 kW TQG	Generator Set, Skid Mounted Tactical Quiet, 200 kW, 50/60 Hz, MEP-809A
	Generator Set, Trailer Mounted, Tactical Quiet, 200 kW, 50/60 Hz, PU-809A

LIST OF ABBREVIATIONS AND ACRONYMS

Abbreviation/Acronym	Definition
AAL	Additional Authorization List
AC	Alternating Current
AFPV	Auxiliary Fuel Pump Solenoid Valve
AFPS	Auxiliary Fuel Pump Switch
AGM	Absorbed Glass Mat
ASR	Air Shut Off Relay
ATB	AC Transformer Box
BAT	Battery
BDS	Battery Disconnect Switch
BII	Basic Issue Items
BIT	Built-in-Test
BRT	Brightness
BLK	Black
BSS	Battle Short Switch
BTB	Bus Transformer Box
CAGE	Commercial and Government Entity
CBR	Chemical, Biological, and Radiological
CCA	Circuit Card Assembly
CCM	Customer Communication Module
CCS	Contractor Control Switch
CCW	Counterclockwise
CDR	Cool Down Relay
CID	Component Identifier
COEI	Components of End Item
CPU	Computer Processing Unit
CRFF	Diode Field Flash
CT	Current Transformer

LIST OF ABBREVIATIONS AND ACRONYMS - Continued

Abbreviation/Acronym	Definition
CTA	Common Table of Allowances
CTR	Crank Termination Relay
CW	Clockwise
DBHI	Dead Bus Relay High Sensing
DBLO	Dead Bus Relay Low Sensing
DC	Direct Current
DCS	Dead Crank Switch
DESCP	Description
DVR	Digital Voltage Regulator
ECM	Engine Control Module
ECS	Engine Control Switch
EGR	Electronic Governor Relay
EMCP	Electronic Modular Control Panel
EMI	Electromagnetic Interference
ESD	Electrostatic Discharge
ESPB	Emergency Stop Pushbutton
UI	Electronic Unit Injector
FCR	Fuel Control Relay
FMI	Failure Mode Indicator
GFCI	Ground Fault Circuit Interrupter
GFE	Government Furnished Equipment
GFR	Generator Fault Relay
GND	Ground
GSC	Generator Set Control
IETM	Interactive Electronic Technical Manual
KFF	Relay Field Flash
kPa	Kilo Pascal
KR	Main Contactor Relay
kVa	Kilovolt-ampere
KVAR	Kilovolt-ampere-reactive
KVARHr	Kilovolt-ampere-reactive hour
kW	Kilowatt
kWh	Kilowatt hour
JTA	Joint Table of Allowances
LCD	Liquid Crystal Display
LED	Light Emitting Diode

LIST OF ABBREVIATIONS AND ACRONYMS - Continued

Abbreviation/Acronym	Definition
LSM	Load Sharing Module
MAC	Maintenance Allocation Chart
MSD	Maintenance Support Device
MTOE	Modified Table of Organization and Equipment
NATO	North Atlantic Treaty Organization
NBC	Nuclear, Biological, and Chemical
NSN	National Stock Number
OL/SC	Overload and Short Circuit Module
OSHA	Occupational Safety and Health Act
PAR	Paralleling Relay
PF	Power Factor
PMCS	Preventive Maintenance Checks and Services
PN	Part Number
PQDR	Product Quality Deficiency Report
PRMTR	Parameter
PSR	Programmable Spare Relay
PW	Pulse Width
PWM	Pulse Width Modulation
RPSTL	Repair Parts and Special Tools Lists
RR	GSC Run Relay
SCR	Silicon Controlled Rectifier
SDR	Supply Discrepancy Report
SMMS	Starter Motor Magnetic Switch
SMR	Starter Motor Relay
SMS	Sync Mode Switch
SP	Spare Input
SR	Slave Receptacle
SRY	Slave Relay
SSP	Speed Setting Potentiometer
TAMMS	The Army Maintenance Management System
TDA	Table of Distribution and Allowances
TDC	Top Dead Center
TDR	Transportation Discrepancy Report
TM	Technical Manual
TMDE	Test, Measurement, and Diagnostic Equipment
TPI	Threads per Inch

LIST OF ABBREVIATIONS AND ACRONYMS - Continued

Abbreviation/Acronym	Definition
TQG	Tactical Quiet Generator
ULLS	Unit Level Logistics System
U/M	Unit of Measure
Vac	Volts Alternating Current
Vdc	Volts Direct Current

SAFETY, CARE, AND HANDLING INFORMATION

The TQG contains no radioactive components or parts or radioactive material requiring special handling or consideration. The TQG contains no electronic modules or components requiring special handling to protect them from electrostatic discharge (ESD).

This manual describes physical and chemical processes that may require the use of chemicals, solvents, paints, or other commercially available material. Users of the manual should obtain the material safety data sheets (Occupational Safety and Health Act (OSHA) Form 20 or equivalent) from the manufacturers or suppliers of materials to be used. Users must be completely familiar with manufacturer/supplier information and adhere to their procedures, recommendations, warnings, and cautions for safe use, handling, storage, and disposal of these materials.

REPAIR PARTS

Repair parts are listed in the Repair Parts and Special Tools List (RPSTL) TM 9-6115-730-24P.

SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

Special Tools; Test, Measure, and Diagnostic Equipment (TMDE); and support equipment are needed for Field maintenance. They are listed in the RPSTL, TM 9-6115-730-24P, and in the Maintenance Allocation Chart (MAC) in WP 0123.

COMMON TOOLS AND TEST EQUIPMENT

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE), Common Table of Allowances (CTA) 50-970, Expendable/Durable Items (Except: Medical, Class V, Repair Parts, and Heraldic Items), or Army Medical Department Expendable/Durable Items CTA 8-100, as applicable to your unit.

END OF WORK PACKAGE

FIELD LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
EQUIPMENT DESCRIPTION AND DATA

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

The 200 kW Tactical Quiet Generator (TQG) is skid-mounted and is designated MEP-809A. When the 200 kW TQG is mounted on a trailer, it is designated PU-809A. The 200 kW TQG consists of a diesel engine that can operate using diesel fuel, or aviation fuel, a brushless alternating current (AC) generator, a digital voltage regulator (DVR), an electronic governing system, a fuel system, a 24 Vdc cranking system, a control system, a protection system, and other devices as described below to achieve a complete engine-driven generator set. The system uses the Caterpillar C-12 engine and a Marathon generator model DOD 751 FR. The engine is electronically controlled. The electronic control is essential to meeting U.S. Environmental Protection Agency (USEPA) and fuel consumption requirements. All the electrical components and assemblies (including the voltage regulator) that provide the required instrumentation and control functions are contained in the Electronic Modular Control Panel (EMCP) located on the generator end (rear) of the TQG. The generator end of the TQG is considered the rear of the generator in the following descriptions. Opening the EMCP and side access panels gives accessibility to all the electrical components and essential engine components. Paralleling receptacles are used to connect the paralleling cable between generator sets of the same family. The generator set family includes a 100 kW TQG. The 100 kW TQG is skid-mounted and is designated MEP-807A. When the 100 kW TQG is mounted on a trailer, it is designated PU-807A. These generator sets use the same control system as the MEP-809A and PU-809A 200 kW TQG and can operate in parallel to share an electrical load.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

ENGINE

The engine for the 200 kW TQG is the Caterpillar C-12 engine (Figure 1, Sheet 1, Item 1). The engine is electronically controlled. The engine control module (ECM) controls the amount of fuel that is injected by the unit injectors. The EMCP provides frequency (speed) control, controls long and short-term stability, and regulates load conditions. High injection pressures help to reduce fuel consumption and emissions. Precise injection timing optimizes the engine's performance for starting, emissions, noise and fuel consumption.

MUFFLER

The muffler/exhaust system (Figure 1, Sheet 1, Item 2) and exhaust tubing are connected to the engine exhaust manifold. This system reduces engine exhaust noise. Exhaust gases are exhausted upward from the top of the generator set.

TURBOCHARGER

The turbocharger (Figure 1, Sheet 1, Item 3) is located on the right side of the engine. Powered by engine exhaust gases, the turbocharger compresses air from the air filter to provide pressurized air to the engine for combustion.

AIR CLEANER ASSEMBLY

The air cleaner assembly (Figure 1, Sheet 1, Item 4) is located on the left side of the engine inside the rear access doors. The air cleaner filters intake air used for engine combustion. The air cleaner is equipped with a restriction indicator (refer to TM 9-6115-730-10, WP 0012/WP 0014).

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued

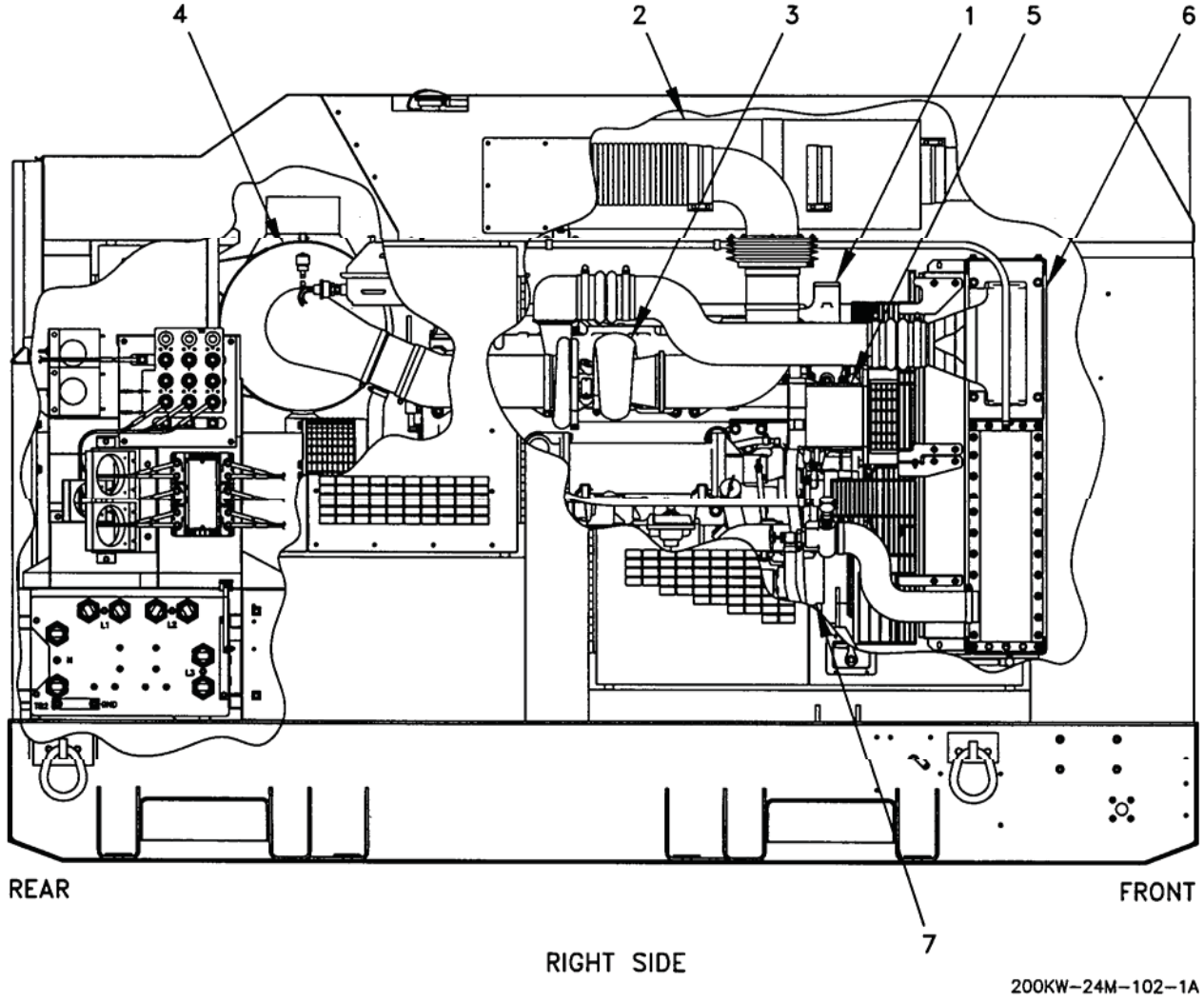

Figure 1. 200 kW Tactical Quiet Generator Location of Components (Sheet 1 of 6).

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued

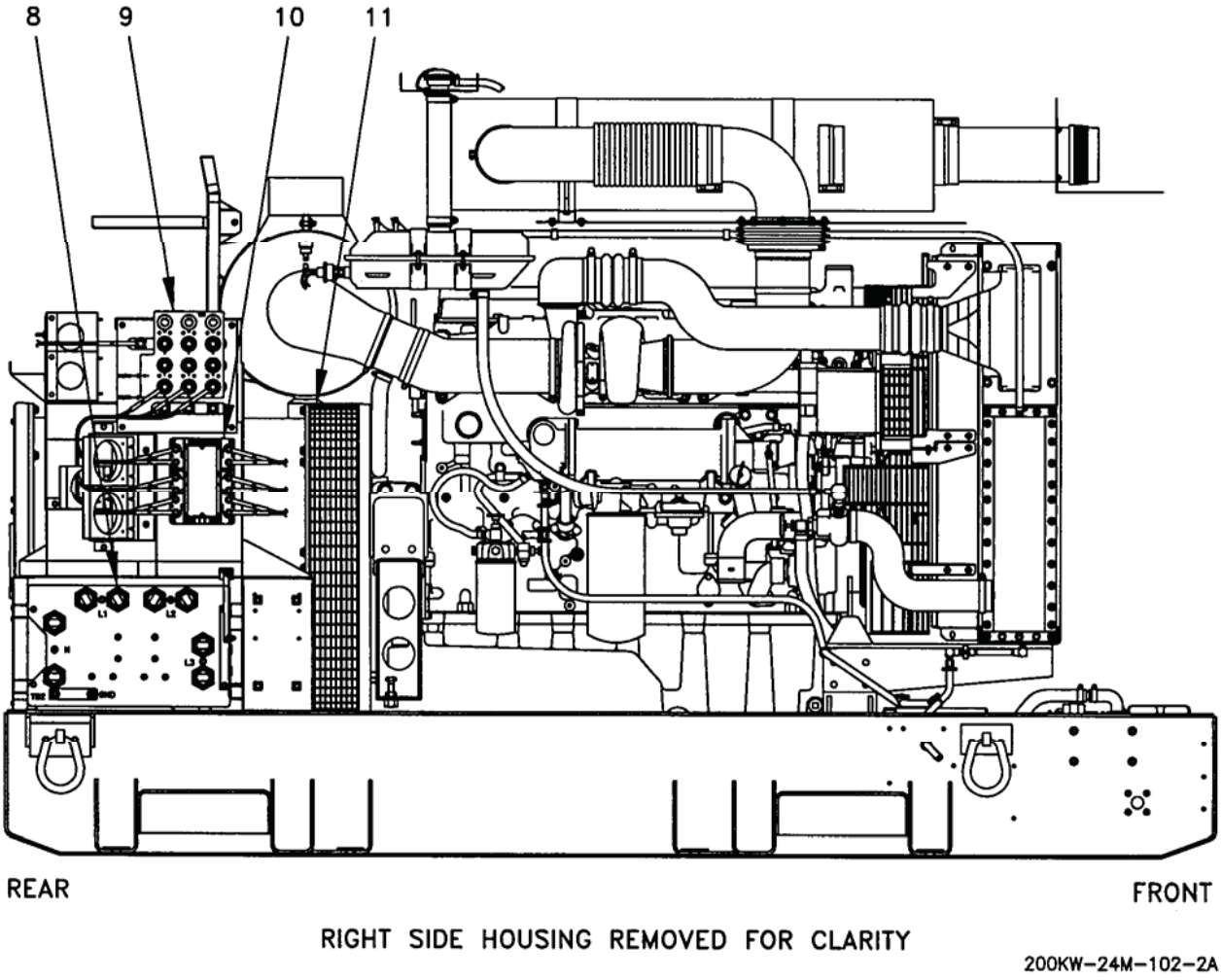

Figure 1. 200 kW Tactical Quiet Generator Location of Components (Sheet 2 of 6).

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued

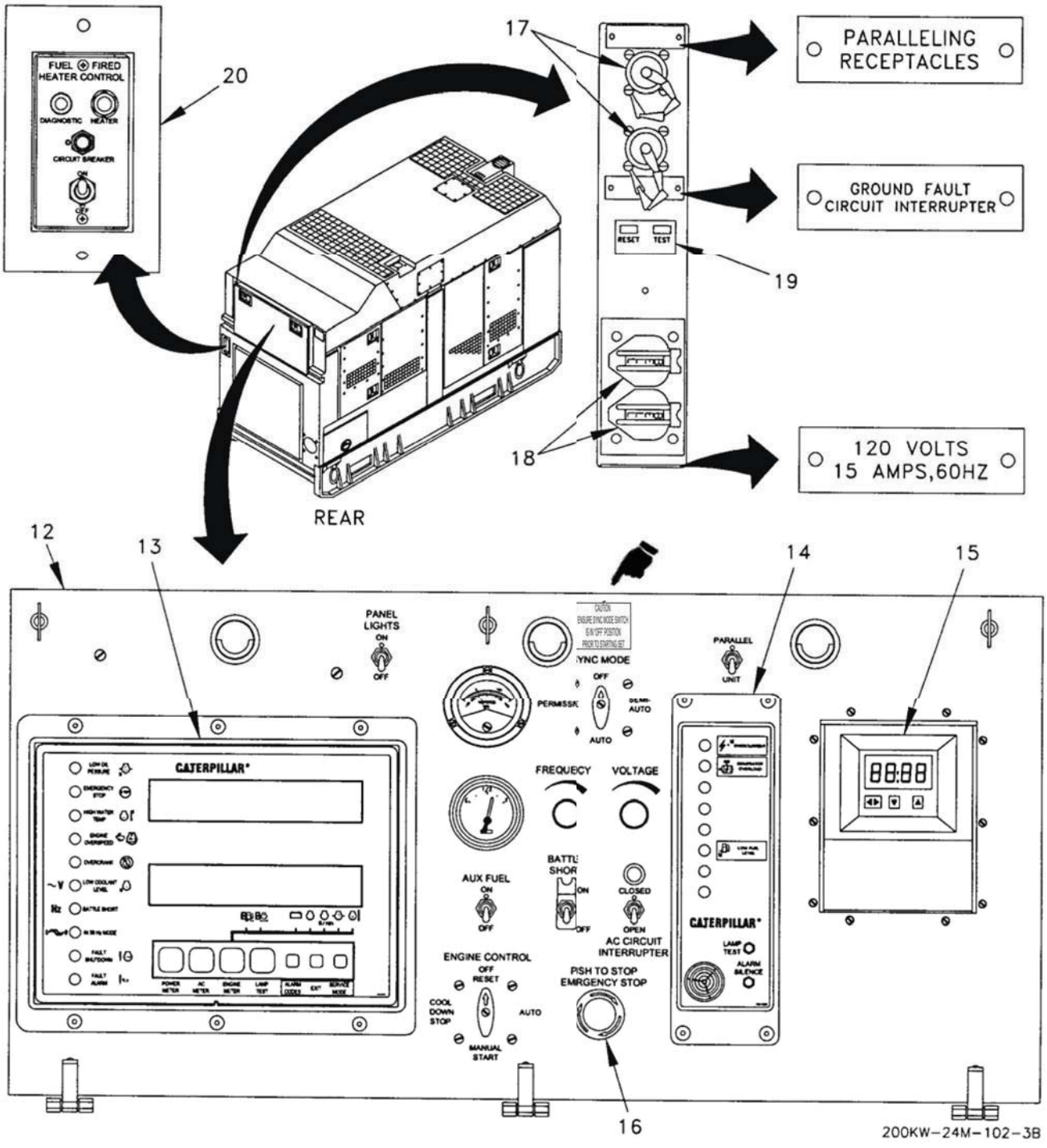

Figure 1. 200 kW Tactical Quiet Generator Location of Components (Sheet 3 of 6).

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued

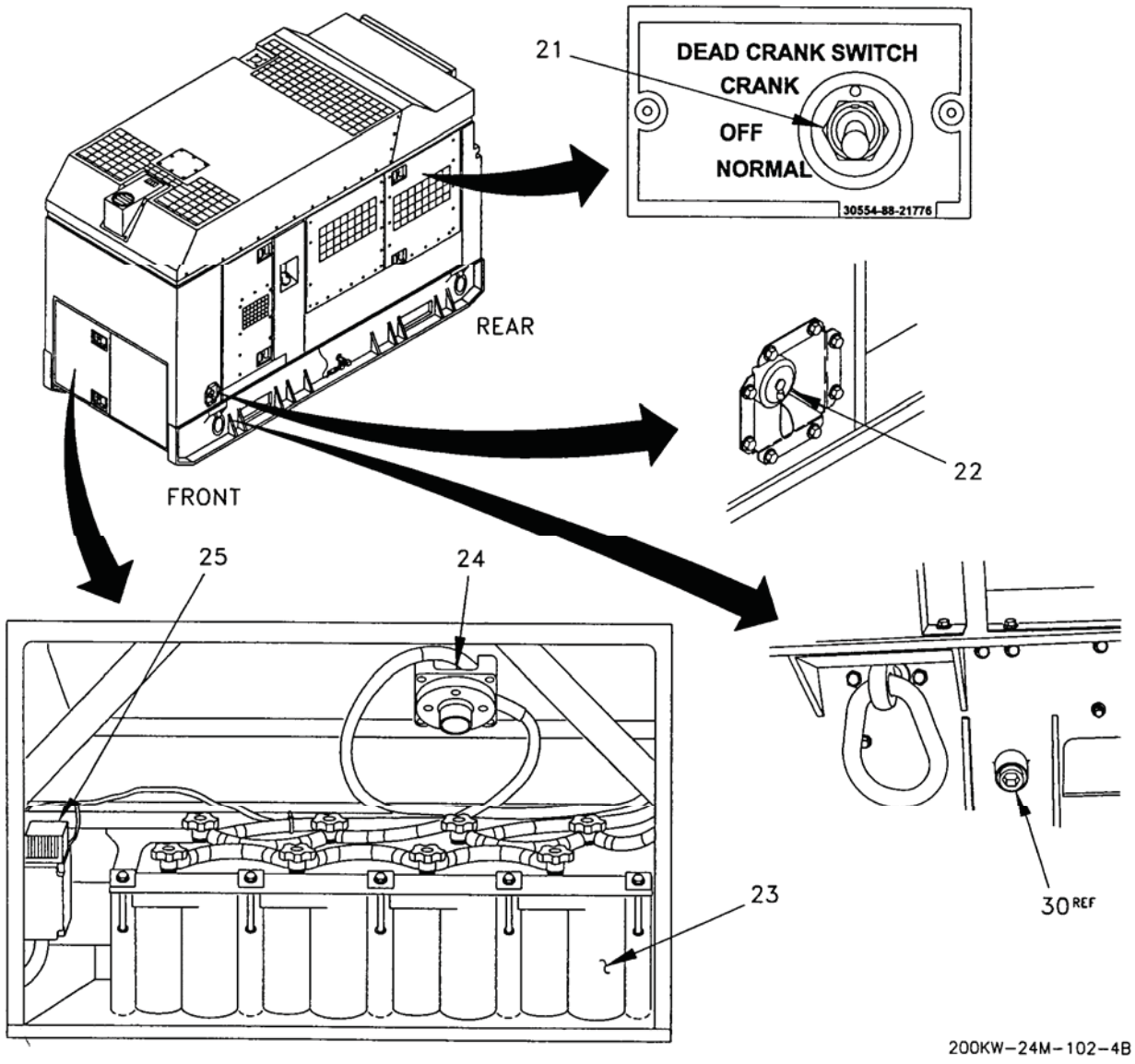

Figure 1. 200 kW Tactical Quiet Generator Location of Components (Sheet 4 of 6).

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued

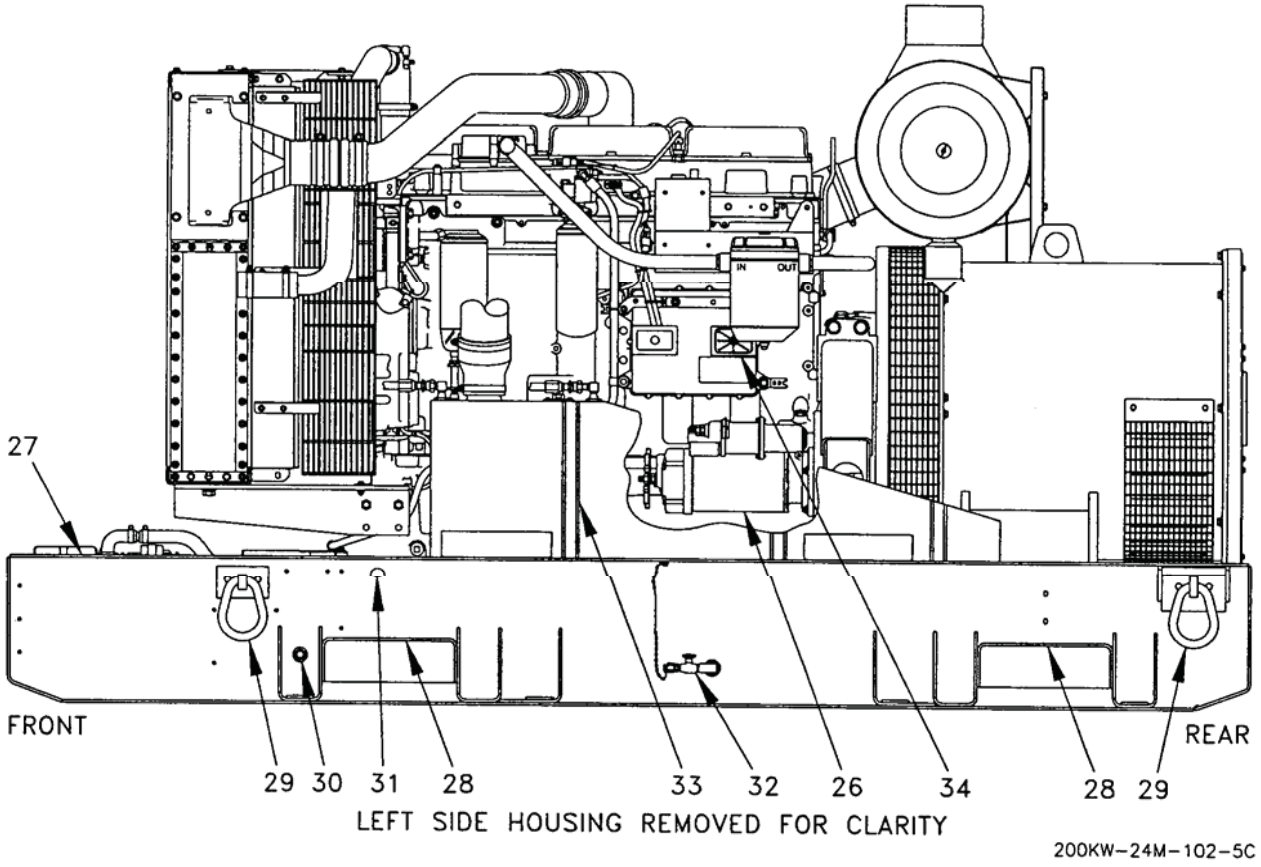

Figure 1. 200 kW Tactical Quiet Generator Location of Components (Sheet 5 of 6).

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued

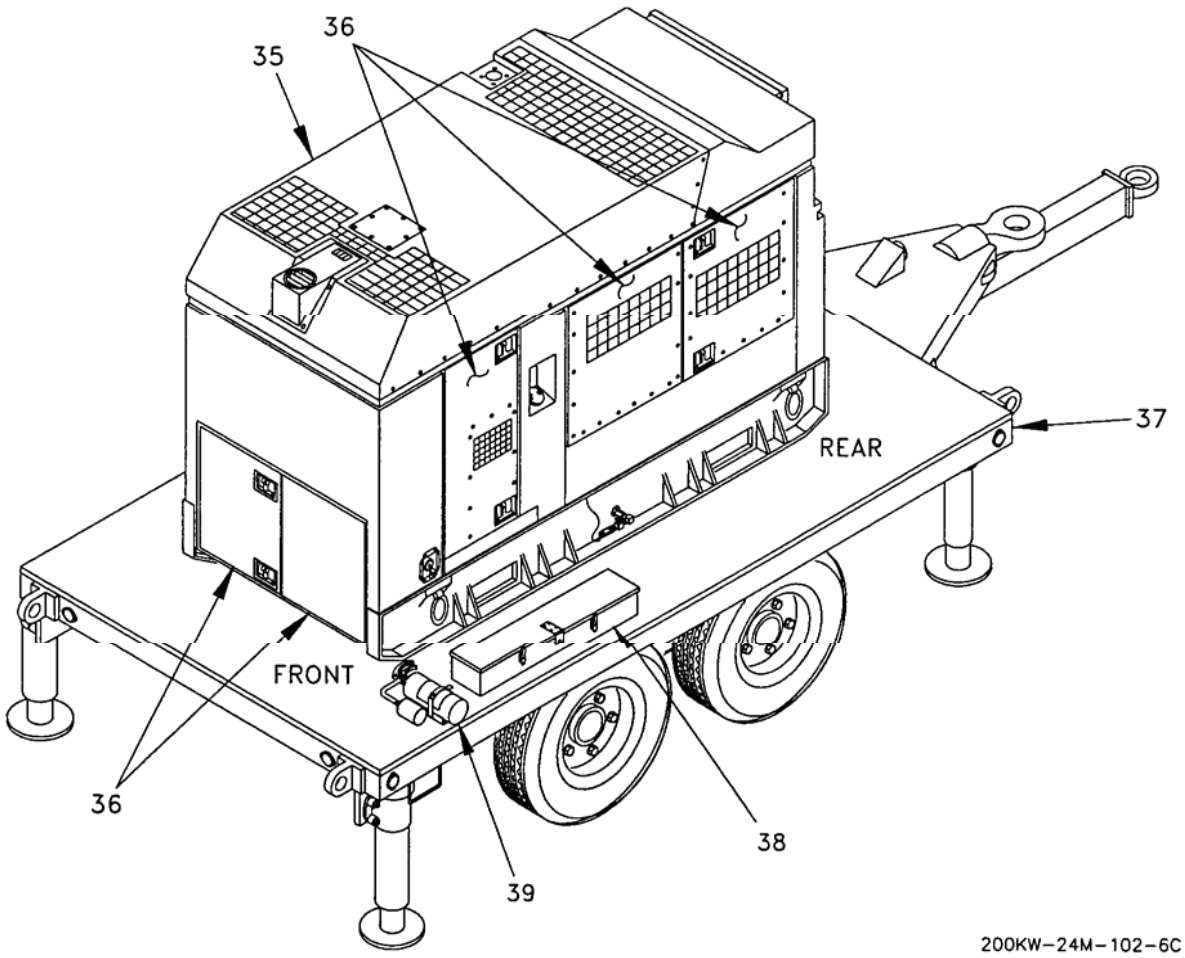

Figure 1. 200 kW Tactical Quiet Generator Location of Components (Sheet 6 of 6).

ALTERNATOR

The alternator (Figure 1, Sheet 1, Item 5) is located on the right side of the engine. The alternator maintains the batteries in a state of full charge. The alternator also provides 24 Vdc voltage for TQG control circuits and to the NATO slave receptacle.

RADIATOR

The radiator (Figure 1, Sheet 1, Item 6) located at the front of the TQG eliminates engine heat via circulated coolant and air. The radiator and engine fan are the primary heat exchanger for cooling engine coolant and turbocharged engine intake air.

WATER PUMP

The water pump (Figure 1, Sheet 1, Item 7) located on the right side of the engine circulates coolant through the engine block and radiator to cool the engine.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued

LOAD BOARD

The load board (Figure 1, Sheet 2, Item 8) connects load cables to the TQG with heavy duty connector lugs and nuts.

RECONNECTION BOARD

The reconnection board (Figure 1, Sheet 2, Item 9) allows the operator to change the TQG generator output voltage for different load applications. The TQG can be configured for 120/208 Vac or 240/416 Vac operation for 50 Hz or 60 Hz.

MAIN LOAD CONTACTOR

The main load contactor K1 (Figure 1, Sheet 2, Item 10) connects/disconnects generator load output to the load board.

AC GENERATOR

The generator (Figure 1, Sheet 2, Item 11) used in the 200 kW TQG is designed to meet military applications for the TQG. The generator is a brushless, single bearing, rotating-rectifier generator. It is close-coupled to the engine via flexible drive disks. Each generator consists of five major components: main stator (armature), main rotor (field), exciter stator (field), exciter rotor (armature), and rotating rectifier assembly.

ELECTRONIC MODULAR CONTROL PANEL

The TQG EMCP (Figure 1, Sheet 3, Item 12) contains controls and indicators for monitoring TQG operation. Located at the rear end of the generator set, the EMCP contains the Generator Set Control (GSC) (Figure 1, Sheet 3, Item 13), an alarm module (Figure 1, Sheet 3, Item 14), and a digital voltage regulator (DVR) (Figure 1, Sheet 3, Item 15). EMCP displays and indicators allow the user to monitor all engine and generator functions with alarms and identification of malfunctions. Malfunction/Symptom Indices in Troubleshooting work packages identify the malfunctions. The Malfunction/Symptom indices in the Troubleshooting work packages list off of the alarm codes and fault codes for TQG malfunctions. The GSC monitors the output frequency of the generator and controls the engine speed to maintain a constant output frequency, regardless of load. The PUSH TO STOP EMERGENCY STOP pushbutton (Figure 1, Sheet 3, Item 16) shuts down the TQG immediately when it is pushed.

PARALLELING RECEPTACLES

The PARALLELING RECEPTACLES panel is located to the left of the Electronic Modular Control Panel (EMCP). The paralleling receptacles (Figure 1, Sheet 3, Item 17) are used to connect the paralleling cable between 100/200 kW generator sets.

CONVENIENCE RECEPTACLES

Two convenience receptacles (Figure 1, Sheet 3, Item 18) are located to the left of the Electronic Modular Control Panel (EMCP) on the PARALLELING RECEPTACLES panel. The receptacles rated 120 Vac, 15A are available at all times during generator operation. The receptacles are protected by a GROUND FAULT CIRCUIT INTERRUPTER with TEST and RESET (Figure 1, Sheet 3, Item 19) functions. The frequency at the convenience receptacle outlets is set by generator frequency and will be 50 Hz or 60 Hz.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued

DEAD CRANK SWITCH

The dead crank switch (Figure 1, Sheet 4, Item 21) is located inside the generator housing at the left rear. During maintenance, the dead crank switch allows the engine to be cranked without starting the engine.

NATO SLAVE RECEPTACLE

The NATO slave receptacle (Figure 1, Sheet 4, Item 22) is located on the left side (front) of the TQG. It is used for 24 Vdc slave starting.

BATTERIES

Four 12 Vdc batteries (Figure 1, Sheet 4, Item 23) located at the front of the generator are connected in series and parallel. The batteries provide power for EMCP controls, engine starting, and to the NATO slave receptacle. These batteries can be disconnected with the Battery Disconnect Switch (Figure 1, Sheet 4, Item 24).

WINTERIZATION KIT (ISSUED TO SELECTED UNITS ONLY)

The winterization kit consists of a fuel-fired heater (Figure 1, Sheet 4, Item 25) to heat engine coolant. The kit also includes resistor heaters located in EMCP. The fuel-fired heater is controlled with the winterization kit control panel (Figure 1, Sheet 3, Item 20).

STARTER

The engine starter motor (Figure 1, Sheet 5, Item 26) is located on the right rear side of the engine. The electric starter engages the flywheel mechanically to start the diesel engine.

SKID BASE

The skid base (Figure 1, Sheet 5, Item 27) provides the main structural support for the engine generator set. The skid base consists primarily of two formed side rails, cross members, mounting pads, fork lift openings, and a bottom plate. Main cross members complete the primary skid base structure to support the engine and generator mounting pads and vibration isolators and reinforce the fork lift openings (Figure 1, Sheet 5, Item 28). Four 25,000 lb (11,400 kg) capacity LIFT/TIEDOWN rings (Figure 1, Sheet 5, Item 29) are attached to the skid weldment. In addition to supporting the engine generator assembly, housing, battery and other components, the skid base has provisions for engine oil drain (Figure 1, Sheet 5, Item 30), coolant drain (opposite side), a water separator drain (Figure 1, Sheet 5, Item 31), and fuel tank drain (Figure 1, Sheet 5, Item 32). The skid base also serves as a support and protective enclosure for the fuel tank.

FUEL TANK

The fuel tank (Figure 1, Sheet 5, Item 33) is a 128 gallon (485L) molded tank located below the diesel engine between the skid assembly side members.

ENGINE CONTROL MODULE

The engine control module (ECM) (Figure 1, Sheet 5, Item 34) monitors most of the engine sensors and controls the amount of fuel that is injected by the unit injectors as well as engine timing functions.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued

GENERATOR HOUSING

The housing (Figure 1, Sheet 6, Item 35) is fabricated from sheet steel and attaches directly to mating flanges on the skid base. The housing is thus removable for unscheduled maintenance and engine or generator removal. Access openings and doors (Figure 1, Sheet 6, Item 36) allow engine, generator, and other component servicing. Each side of the rear housing has a set of double doors and the large doors at the front of the housing provide accessibility. The housing structure incorporates acoustic damping foam and internal baffle structures to reduce engine noise. The rugged design of the housing includes reinforced corners and access openings to meet transportability, operational, and handling requirements of a mobile military generator set.

TRAILER-MOUNTED CONFIGURATION (PU-809A)

The skid-mounted TQG can be mounted on a model XM1061 E1 5-ton trailer (Figure 1, Sheet 6, Item 37). In this configuration, the TQG can be towed and positioned as required. In the power-unit configuration, the trailer-mounted TQG has an accessory box (Figure 1, Sheet 6, Item 38) and two fire extinguishers (Figure 1, Sheet 6, Item 39). The TQG skid is bolted directly to the trailer bed and frame.

EQUIPMENT DATA

Table 1 lists equipment data for the 200 kW TQG.

Table 1. 200 kW TQG Equipment Data.

EQUIPMENT	DATA
200 kW Tactical Quiet Generator Set	MEP-809A /PU-809A
Overall length	114 in. (290 cm)
Width	50 in. (127 cm)
Height	75 in. (191 cm)
Weight	
Wet (includes fuel)	9,300 lb (4218 kg)
Dry	8,200 lb (3719 kg)
Engine	
Manufacturer	Caterpillar
Model	C-12, serial number BCY series
Type	Six cylinder, in-line, four cycle, turbocharged diesel
Horsepower	395 hp @ 1800 rpm (60 Hz) 329 hp @ 1500 rpm (50 Hz)
Displacement	732 cu. in (12.0L)
Valves per cylinder	Four (two inlet, two exhaust)
Valve lash setting (cold engine)	Inlet: 0.015 in. (0.38 mm) Exhaust: 0.025 in. (0.64 mm)
Cooling system	
Type	Pressurized radiator and coolant pump
Capacity	42 qt (39.7L)
Normal operating temperature	170°F to 200°F (77°C to 93°C)
Temperature indicating system voltage	24 Vdc, range programmable

EQUIPMENT DATA - Continued

Table 1. 200 kW TQG Equipment Data - Continued.

EQUIPMENT	DATA
Lubricating system	
Type	Full flow, circulating pressure
Pump type	Positive displacement gear
Capacity	36 qt (34.1L)
Normal operating pressure	25 to 70 psi (241 to 483 kPa)
Fuel system	
Fuel type	DF-1, DF-2, (1-D/2-D), JP5, JP8
Fuel tank capacity	128 gal (485L)
Consumption rate	8 hour tank capacity at full load (8.25 GPH)
Auxiliary fuel pump	
Manufacturer	Walbro Corp.
Voltage rating	24 Vdc (16 to 30 Vdc)
Delivery rate	34 gph at 30 Vdc; 17 gph at 24 Vdc
Fuel level switch	
Manufacturer	Madison
Type	Float
Model	0116-2303
Voltage	18-32 Vdc
Engine starting system	
Batteries	
Manufacturer	Optima
Voltage	12 Vdc, qty 4 (sealed units)
Starter	
Manufacturer	Caterpillar
Model	207-1556
Voltage rating	24 Vdc
Drive type	Direct
Alternator	
Manufacturer	Caterpillar
Model	4N3986
Voltage rating	24 Vdc, 50A
Drive type	Belt
Generator	
Manufacturer	Marathon
Model	571PSL4800
Type	Alternating current, synchronous, brushless

EQUIPMENT DATA - Continued

Table 1. 200 kW TQG Equipment Data - Continued.

EQUIPMENT	DATA	
Load capacity	200 kW at 60 Hz (1,800 rpm)	166 kW at 50 Hz (1,500 rpm)
Current ratings		
120/208 Vac connection	694A at 60 Hz	578A at 50 Hz
240/416 Vac connection	347A at 60 Hz	289A at 50 Hz
Power factor	0.8	
Cooling	Fan cooled	
Drive type	Direct coupling	
Duty classification	Continuous	
Governing system		
Load measuring unit		
Manufacturer	Caterpillar	
Model	161-0797	
Engine control module		
Manufacturer	Caterpillar	
Model	198-9253	
GSC Protective Relay Setpoint Values		
Low oil pressure shutdown	26 psi (179 kPa)	
High water (coolant) temperature shutdown	230°F (110°C)	
Engine overspeed	2120 rpm	
Overcrank (total cycle crank time)	90 seconds	
High oil temperature shutdown	253°F (123°C)	
Overvoltage alarm threshold	125% overvoltage for programmed voltage	
Generator overvoltage shutdown threshold	125% of nameplate voltage	
Generator undervoltage alarm threshold	82% of programmed voltage	
Generator undervoltage shutdown threshold	75% of nameplate voltage	
Generator overfrequency alarm threshold	63 Hz for 60 Hz operation; 53 Hz for 50 Hz operation	
Generator overfrequency shutdown threshold	66 Hz for 60 Hz operation; 55 Hz for 50 Hz operation	
Generator underfrequency alarm threshold	57 Hz for 60 Hz operation; 48 Hz for 50 Hz operation	
Generator underfrequency shutdown	57 Hz for 60 Hz operation; 45 Hz for 50 Hz operation	
Generator phase overcurrent alarm threshold	160% of nameplate current	
Generator total overcurrent alarm threshold	160% of nameplate current	
Generator phase overcurrent shutdown threshold	160% of nameplate current	
Generator total overcurrent shutdown threshold	160% of nameplate current	
Reverse power shutdown	15% to 17%	

END OF WORK PACKAGE

FIELD LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
THEORY OF OPERATION

GENERAL

This work package contains functional descriptions of the generator set and explains how TQG functional systems interact with one another.

ENGINE OVERVIEW

The 200 kW TQG is powered by an in-line six cylinder diesel engine. The engine firing order is 1-5-3-6-2-4. The engine rotation is counterclockwise when the engine is viewed from the flywheel end (rear) of the engine. The engine uses a turbocharger and an air-to-air aftercooler. The engine cylinder bore is 5.12 inch (130 mm) with stroke of 5.91 inch (150 mm). Total displacement is 732 cu. in. (12.0L). The engine electronic unit injector system (EUI) eliminates mechanical components that are used in a pump-and-line system. The EUI provides increased control of the timing and increased control of the fuel air mixture. The timing advance is achieved by precise control of the unit injector timing. Adjusting injection duration controls engine rpm. An engine speed sensor provides information to the Engine Control Module (ECM) for detection of cylinder position and engine rpm. The engine has built-in diagnostics to ensure that all of the components are operating properly. In the event of a system component failure, the operator will be alerted via the Generator Set Control (GSC) component of the TQG Electronic Modular Control Panel (EMCP). Numerical codes of the faulty component or condition are displayed on the GSC. Intermittent faults are logged and stored in the ECM memory.

Engine Control Module

The Engine Control Module (ECM) automatically provides the correct amount of fuel in order to start the engine. The ECM is integrated with the engine fuel system and the engine air inlet and exhaust system to control the fuel delivery and the injection timing electronically. The ECM provides timing control and fuel air ratio control. Injection timing is achieved by the precise control of the injector firing time. Adjusting the injection duration controls engine rpm. ECM energizes unit injector solenoids to start the injection of fuel and de-energizes the unit injector solenoids to stop the injection of fuel.

Electronic Components

The engine uses three types of electronic components: input, control, and output. Input components send variable electrical signals (voltage, frequency, or pulse width (PW)) to the ECM. ECM interprets input signals about the condition, environment, or operation of the TQG. ECM firmware evaluates input data to control engine components such as fuel injector solenoids or to log and relay information to EMCP.

ENGINE SENSORS

Boost Pressure

Boost is defined as the difference between the inlet and outlet pressures of the turbocharger. The atmospheric pressure sensor on the air inlet to the turbocharger is used to reduce smoke emissions at high altitudes and as the reference for calculating turbocharger boost pressure. Boost pressure measurements are used to reduce smoke emissions during acceleration. The outlet pressure sensor is located at the turbocharger outlet and measures pressure from 3 to 49 psi (20 to 340 kPa).

Oil Pressure

The ECM monitors oil pressure following engine start up and may display a low oil pressure alarm diagnostic code. The code will not be logged for 15 seconds following start up. The output of the oil pressure sensor is pulse width modulated. The base frequency is 500 ±150 Hz. The duty cycle varies from 13 to 85% corresponding to 0 to 100 psi (0 to 690 kPa).

Coolant Level Sensor

A sensor in the coolant detects dangerously low levels of coolant in the system. The output of this sensor is connected to the GSC for display and control.

Crankshaft (bottom or primary) and Camshaft (top or secondary) Engine Speed/Timing Sensors

Two timing sensors determine engine timing. The primary sensor monitors crankshaft rotation and is used to determine both engine rpm and fuel injection timing. The other sensor senses rotation of the camshaft. With these redundant sensors, the probability of a failure shutting down the engine is greatly reduced. All of the timing for fuel injection is based on the output of these sensors. If one fails, timing can continue based on the output of the other sensor.

Fuel Pressure Sensor

The ECM monitors fuel pressure at the fuel pump between 0 and 100 psi (0 and 690 kPa).

Intake Manifold Air Temperature Sensor

The ECM monitors air manifold inlet temperature and uses this information to adjust ignition timing.

Coolant Temperature Sensor

The coolant temperature is used to determine whether to operate the engine in cold mode and to notify the operator of excessive engine temperature. If the coolant temperature is below 63°F (17°C) and the engine is not in the cranking phase of starting, the timing is advanced and fuel delivery is reduced to improve cold engine performance. Cold mode remains active until the coolant temperature rises above 63°F (17°C) or until the engine has been running five minutes.

ENGINE SENSORS - Continued

Speed Input

The speed input signal to the ECM is a pulse width modulated control signal which eliminates the mechanical throttle and governor linkages along with their adjustments. The nominal frequency is 500 ±200 Hz. The pulse width varies from 10% to 90% corresponding to idle and maximum speed of the engine. Signals outside of this range are considered a failure and a fault code is logged.

Fuel Temperature Sensor

Fuel temperature is monitored and used to adjust fuel rate calculations and for fuel temperature power correction. When fuel temperature exceeds 86°F (30°C), fuel rates are corrected to provide consistent power. Maximum power correction is achieved at 158°F (70°C). Fuel temperatures exceeding 176°F (80°C) for 30 seconds cause a diagnostic code to be logged.

TDC Probe Input

A connector on the engine harness is used to calibrate engine timing. A special probe is inserted into the engine and this extra connector is connected to the probe. This special probe is used to determine how long after the speed/timing sensor(s) sense top dead center (TDC) it actually occurs. This data is programmed into the engine ECM at calibration.

ENGINE STARTING SYSTEM

The engine starting system (Figure 1) consists of four 12-volt batteries connected in series and parallel, a 24 Vdc starter, a 24 Vdc battery charging alternator, a magnetic pickup (for sensing engine speed) and the related switches and relays (described below) required for control of the starting system. The four 12 Vdc batteries are configured in sets of two with each set consisting of two 12 Vdc batteries in parallel and the sets connected in series to make a 24 Vdc system. The PUSH TO STOP EMERGENCY STOP pushbutton on the EMCP will automatically disable the starting system and shut down the TQG if it is pushed in. For engine cranking, battery power is supplied to the starter motor through the starter solenoid that in turn is controlled by the EMCP. The starter engages the engine flywheel causing the engine to turn over. As the engine accelerates to above idle speed (sensed by the magnetic pickup), the EMCP disengages the starter. Moving the ENGINE CONTROL switch to COOL DOWN/STOP may also stop the starting sequence. The engine may be cranked without starting by engaging the DEAD CRANK SWITCH. The DEAD CRANK SWITCH is a three-position switch. Up position is CRANK, the center is OFF, and the lower position is NORMAL (operation). With the DEAD CRANK SWITCH in CRANK, the starter motor is energized without activating any other starting or control function. With the switch in the OFF center position, the system is off. With the switch in NORMAL (operation) position, the TQG may be cranked and started. The belt-driven engine alternator charges the batteries. The battery charging alternator also supplies GSC power. Normal operating indication depends on the state of charge in the batteries. A low charge, such as exists immediately after engine starting, will cause a high reading. If the batteries are dead or inoperable, external +24 Vdc power can be supplied to the TQG via the 24 Vdc NATO slave receptacle to start the generator set engine. Cold outside temperatures make starting the engine difficult. The engine ECM controls the ether start to improve the cold starting capability. The ether start is described in the Air Intake and Exhaust System paragraph.

ENGINE STARTING SYSTEM - Continued

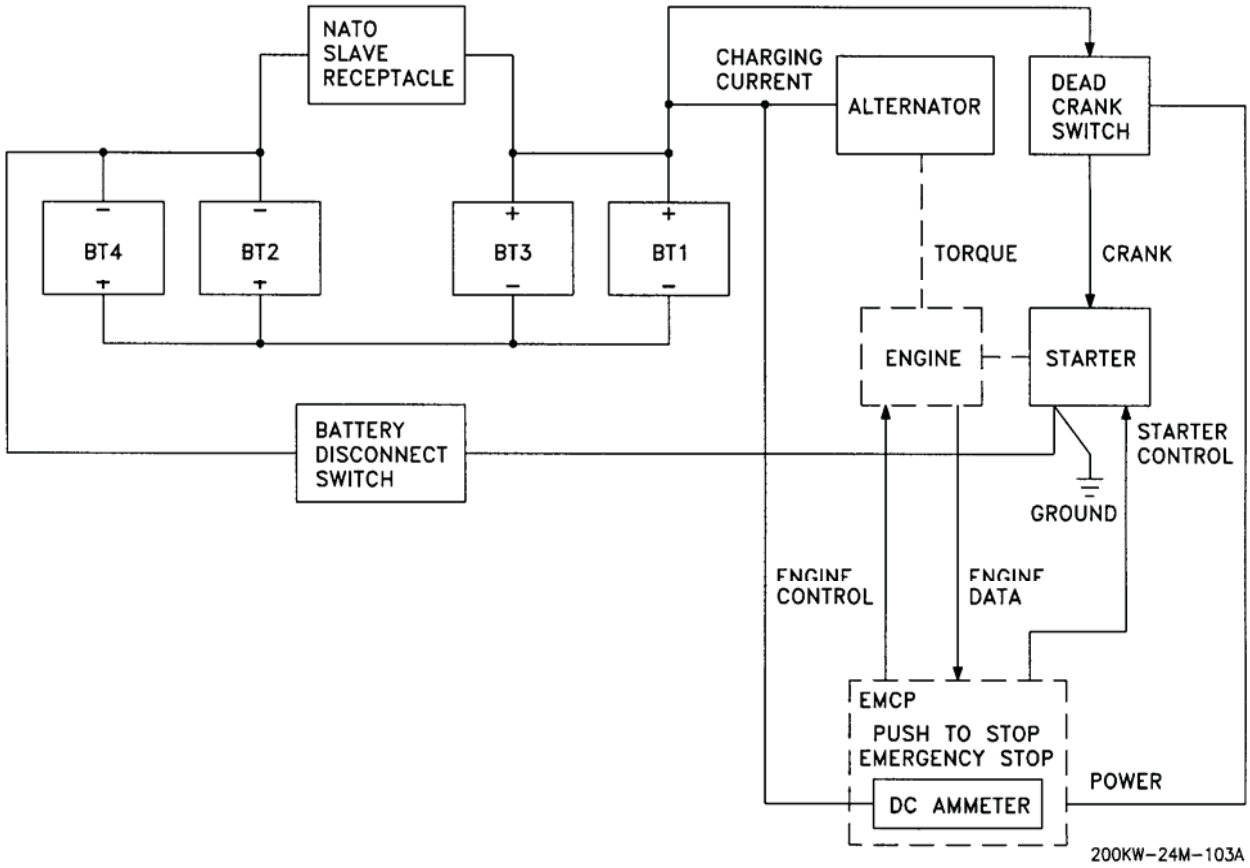

Figure 1. Engine Starting System.

FUEL SYSTEM

The fuel system (Figure 2) consists of hoses, steel injector piping, fuel tank, fuel filter/water separator, fuel transfer pump, and injectors. The fuel transfer pump draws fuel from the fuel tank through a fuel filter/water separator that removes water and small impurities. The fuel is then pushed through the secondary fuel filter that removes even smaller particles from the fuel. The fuel then enters a fuel manifold servicing unit injectors. Through the cam-actuated injectors fuel enters the diesel engine combustion chamber, where it is mixed with air and ignited. The fuel that is not used is cooled and returned to the fuel tank via an excess fuel return line. When the fuel level is low, the fuel level switch will either supply power to the external auxiliary fuel pump for external fuel supply or shut down the TQG to prevent it from completely running out of fuel. If a diesel engine runs out of fuel, it is necessary to fill the fuel filters, purge all air from the lines and pumps, and bleed all injectors.

FUEL SYSTEM - Continued

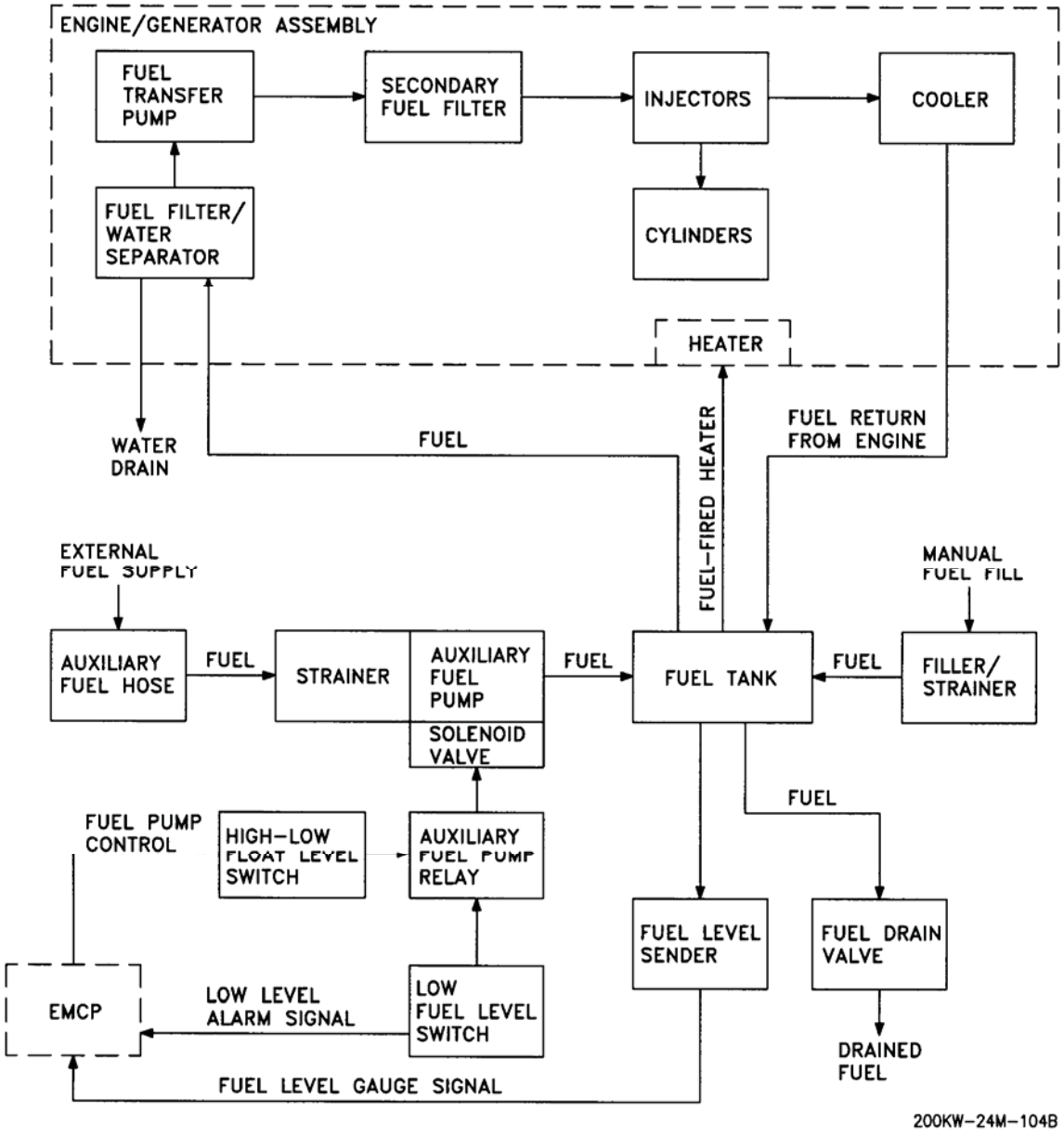

Figure 2. Fuel System.

AUXILIARY FUEL SYSTEM

The auxiliary fuel system consists of an external fuel supply, a fuel hose, a 24 Vdc auxiliary fuel pump with strainer and solenoid valve, fuel lines, and an auxiliary fuel pump relay. When the EMCP AUX FUEL switch is ON, the auxiliary fuel pump can transfer fuel from an external fuel supply to the generator fuel tank. The fuel level float in the fuel tank shuts off power to the auxiliary fuel pump via the auxiliary fuel pump relay when the TQG fuel tank is full and reactivates the pump as the level drops. The fuel level indicator on the EMCP indicates the fuel level of the fuel tank from the empty (E) to full (F).

ELECTRONIC UNIT INJECTOR FUEL SYSTEM

The engine uses an EUI in each cylinder. A solenoid on each injector controls the amount of fuel delivered by the injector. An engine speed/timing sensor detects top dead center (TDC). All fuel injection is timed off the occurrence of TDC. The ECM determines how much fuel is to be delivered based on the difference between desired and actual speed. The ECM then sets the timing from TDC for each cylinder based on data received from the coolant temperature sensor, inlet air manifold temperature, atmospheric pressure sensor, and turbocharger outlet (boost) pressure sensor. The ECM adjusts timing and fuel delivery for best engine performance, fuel economy, and white smoke control.

The EUI fuel system uses a mechanically actuated electronically controlled unit injector. All fuel systems for diesel engines use a plunger and barrel to pump fuel under high pressure into the combustion chamber. Fuel is pumped into the combustion chamber in precise amounts to control engine performance. The EUI uses a fuel injection pump camshaft lobe to power the plunger.

Engine Control Module (ECM)

The ECM computer electronically controls engine performance. The ECM uses engine performance data gathered by several sensors to make adjustments to the fuel delivery, injection pressure and injection timing. The ECM contains programmed performance maps (software) to define horsepower, torque curves and rpm. This software is commonly called the personality module. The ECM logs faults of engine performance. The ECM can diagnose problems with itself and the sensors and sensed values input to the module. When a problem is detected, a diagnostic code is generated and sent to the GSC where it is displayed. In most cases, the code is also logged with the engine hour value indicating when the failure occurred. When diagnostic codes are generated, they are referred to as active. They indicate a problem presently exists. These should be serviced first. Diagnostic codes stored in memory are referred to as logged failures. The existence of a logged code does not indicate a current failure. The failure may have occurred some time ago. The logged codes are useful when troubleshooting an intermittent problem. Logged inactive codes require a generic password to clear as described in WP 0004 and WP 0083. Codes not requiring a password are automatically deleted from memory after 100 engine operating hours.

Fuel Transfer Pump and Fuel Flow

The fuel supply and injection circuit (Figure 3) is a conventional design for unit injected engines. It uses a fixed-clearance gear fuel transfer pump to deliver fuel from the fuel tank to the unit injectors. The fuel transfer pump is driven by the lower accessory drive gear. Fuel is pulled from the fuel tank and through the fuel filter/water separator into the pump. The pump incorporates a check valve to permit fuel flow around the gears for hand priming. The pump has a pressure regulating valve to protect the system from extreme pressure. The excess fuel flow provided by the fuel transfer pump cools and purges the air from the unit injectors. The fuel is pulled from the tank through the fuel filter/water separator and then through a five micron fuel filter. A fuel priming pump is located on the fuel filter base. If unit

ELECTRONIC UNIT INJECTOR FUEL SYSTEM - Continued

injectors must be replaced, the priming pump can be used to fill the system after draining the fuel supply and return manifolds. The fuel flows continuously from the fuel supply manifold through the unit injectors and excess fuel is returned to the fuel tank by the fuel return manifold. A flow regulating orifice is located in the adapter manifold to maintain sufficient back pressure in the system to fill the unit injectors. Optimal fuel flow is provided to the unit injectors without excessive fuel tank heating. Each cylinder contains an electronically controlled, mechanically actuated unit injector. A solenoid on each unit injector controls the amount of fuel delivered by the unit injector. The ECM sends a signal to each unit injector solenoid, to provide complete control of the engine.

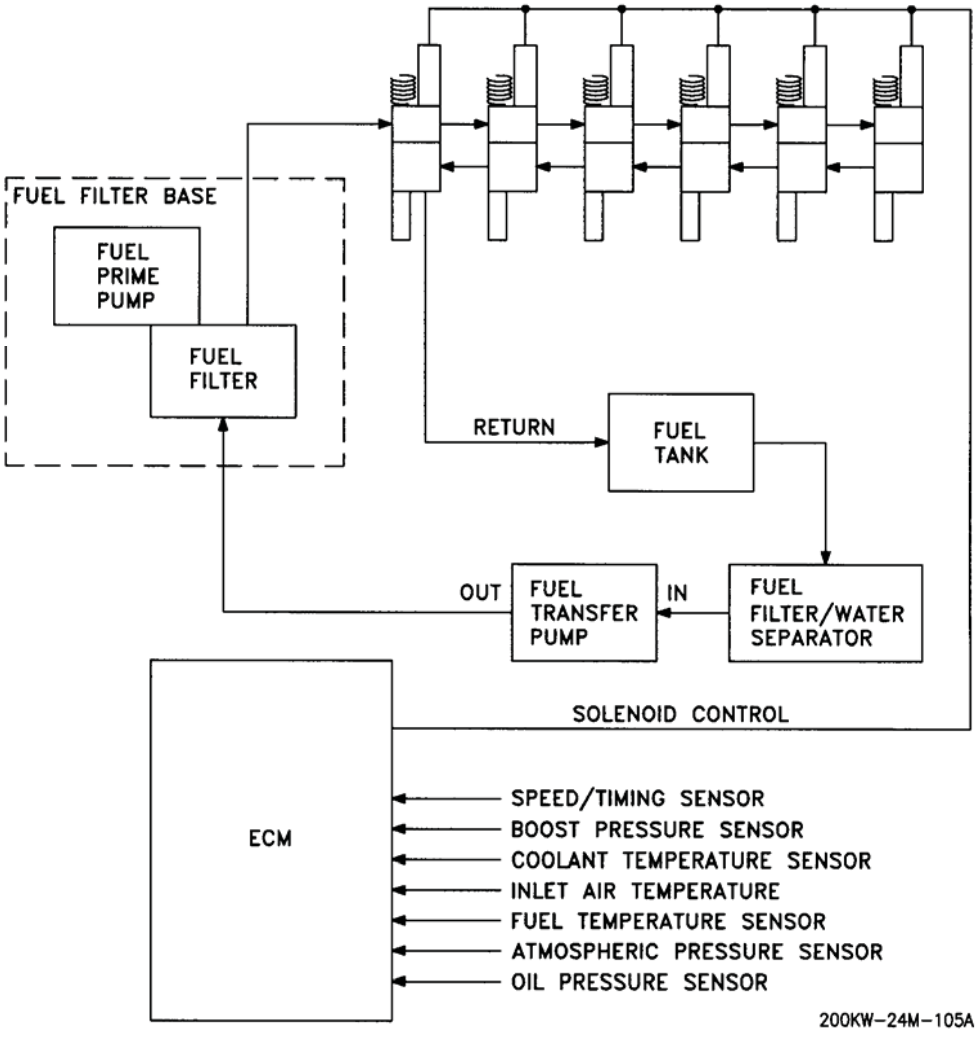

Figure 3. Fuel Supply and Injection.

ELECTRONIC UNIT INJECTOR FUEL SYSTEM - Continued

Fuel Injection

The ECM controls the amount of fuel injected, by varying signals to the unit injectors. The unit injectors will inject fuel only if the unit injector solenoid is energized. The ECM sends a 90 volt signal to the unit injector solenoid to energize it. By controlling the timing and duration of the 90 volt signal, the ECM can control injection timing and the amount of fuel injected. The ECM sets certain limits on the amount of fuel that can be injected. One limit based on boost pressure controls the fuel/air ratio for emissions control purposes. When the ECM senses a higher boost pressure (more air into cylinder), it increases the limit to allow more fuel into cylinder. A second limit is based on the horsepower rating of the engine. (It is similar to the rack stops and torque spring on a mechanically-governed engine and provides horsepower and torque curves for a specific engine rating.) Injection timing depends on engine rpm, load, and other operation factors. The ECM knows where top center of cylinder number one is from the signal provided by the engine Speed/Timing Sensor. It decides when injection should occur relative to top center and provides the signal to the unit injector at the desired time.

Unit Injector Mechanism

The unit injector mechanism generates downward force to pressurize the fuel in the injector. At the precise time, the unit injector injects fuel into the combustion chamber. The camshaft gear is driven by an idler gear which is piloted in the cylinder block and bolted through the timing gear housing to the block. The idler gear is driven by the crankshaft gear. Timing marks on the crankshaft gear, idler gear, and camshaft gear are aligned to define the correct relationship between piston and valve movement. The camshaft has three cam lobes for each cylinder. Two lobes operate the inlet and exhaust valves, and one operates the unit injector mechanism. Force is transmitted from the unit injector lobe on the camshaft through a lifter to a pushrod. Force is transmitted from the pushrod through the rocker arm assembly to the top of the unit injector.

ENGINE COOLING SYSTEM

The engine cooling system (Figure 4) consists of a radiator, hoses, thermostat, water pump, surge tank and expansion bottle, a belt driven fan, and cooling jackets. The water pump forces coolant through passages (cooling jackets) in the engine block and cylinder head and an engine oil cooler. The coolant absorbs heat from the engine as it passes through these passages. A gear driven water pump located in the right hand side of the engine supplies the coolant for the engine cooling system. The coolant is supplied to the engine oil cooler, cylinder head, and cylinder liner. Coolant is pulled from the bottom of the radiator into the water pump by an impeller. The water pump is gear driven at 1.17 times engine speed by an idler turned by the crankshaft gear. The water pump impeller is an open-face, radial vane cast iron design. The coolant is pumped through an engine oil cooler and into a supply manifold in the cylinder block. The supply manifold distributes coolant at each cylinder where coolant flows around and cools the upper portion of the cylinder liner. Coolant flow from each liner enters the cylinder head that is divided into single cylinder cooling sections. The coolant flow is split at each liner so that 60 percent flows around the liner and the remainder bypasses the liner and flows directly to the cylinder head. In the cylinder head coolant flows across the center of the cylinder and the injector seat boss. At the center of the cylinder, coolant flows up around the injector sleeve over the exhaust port and exits into return manifold. The return manifold collects the coolant from each cylinder and directs the flow to thermostat housing. With the thermostat closed, coolant flows through the regulator, bypassing the radiator, and back to the water pump for recirculation. With the thermostat open, the coolant is directed through the radiator and back to the water pump inlet. The full-flow bypass coolant thermostat regulates the outlet temperature of the coolant. When the engine is cold the valve is closed, and the coolant flows through the regulator, bypassing the radiator, to the water pump inlet for recirculation. As the coolant temperature increases, the thermostat opens to direct some of the coolant to the radiator, bypassing the remainder to the water pump inlet. At full operating temperature, the valve moves to the

ENGINE COOLING SYSTEM - Continued

open position, and all the coolant flows to the radiator and then back to the water pump inlet to provide maximum heat release. A shunt line extends from the top of the water pump to the surge tank. The shunt line must be routed properly to avoid trapping any air. By providing a constant flow of coolant to the water pump, the shunt line prevents cavitation. The cooling fan circulates air through the radiator where the coolant temperature is reduced. In addition, the fan cools engine and generator set components within the TQG housing by drawing in air from outside the housing through the baffles, circulating the air through the housing, and forcing the air through the radiator and out through the housing exhaust vents on the roof. The housing is designed to operate with the doors closed which ensures that the main alternator and other TQG components have access to a good flow of cooling air from outside the generator set. The normal operating temperature of the generator set is 170° F to 200° F (77° C to 93° C). A coolant temperature sensor provides automatic shut down in the event that coolant temperature exceeds 230°F (110°C). The lower GSC display indicates the engine coolant temperature.

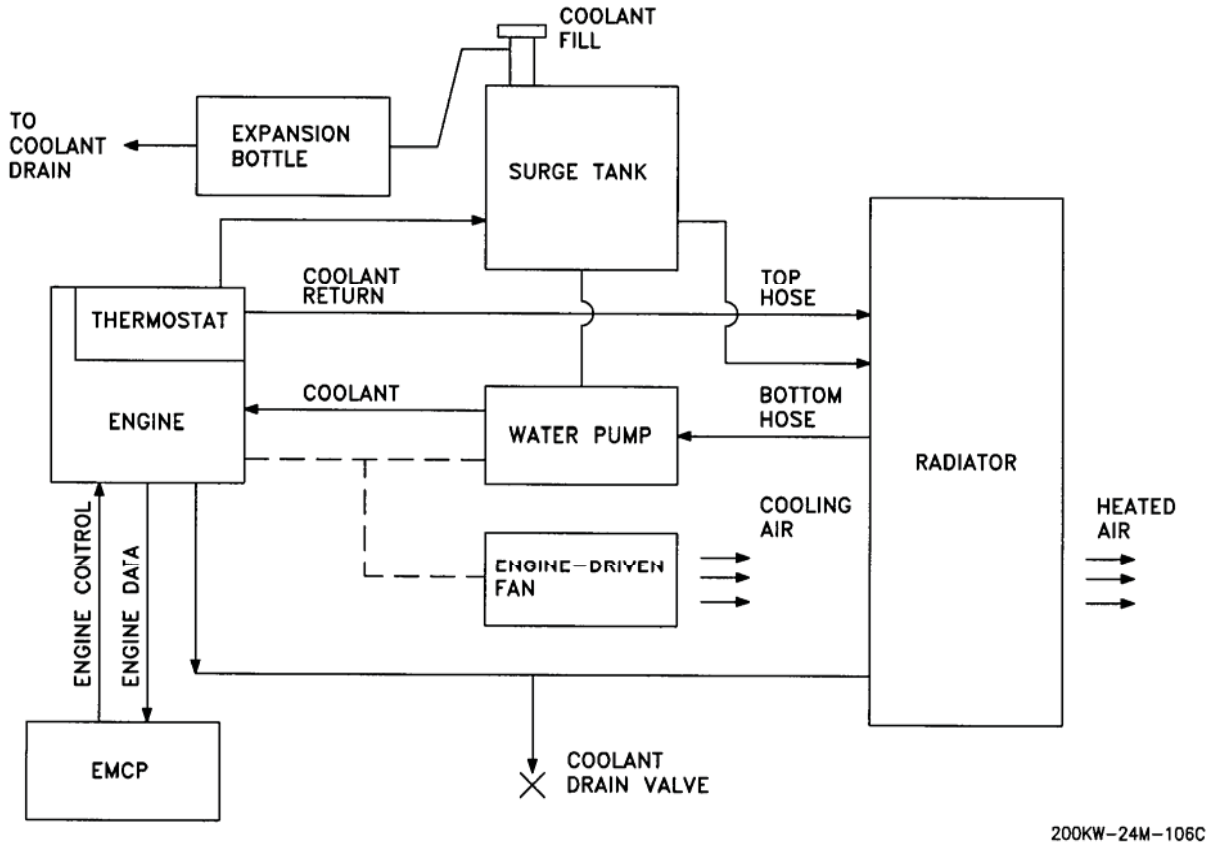

Figure 4. Engine Cooling System.

LUBRICATION SYSTEM

The lubrication system (Figure 5) consists of an oil pan, dipstick, pump, oil pressure sensor, and filter. The oil pan is a reservoir for engine lubricating oil. Engine oil lubricates, cleans, cools, seals, and preserves engine parts. The dipstick indicates oil level in the oil pan. A pump draws oil from the oil pan and through a screen that blocks large objects from entering the oil pump and oil cooler. The oil then passes through a spin-on type filter where small impurities are removed. From the filter, oil enters the engine and is distributed to the engine's internal moving parts through internal passageways. Oil is also supplied to the turbocharger. After passing through the engine, the oil returns to the oil pan. The lower GSC display indicates oil pressure sensed by the oil pressure sensor in the engine. The engine will shut off automatically if the oil pressure drops below 30 psi (207 kPa) and the red LOW OIL PRESSURE indicator on the GSC will flash. The oil level can be checked with the engine running.

LUBRICATION SYSTEM - Continued

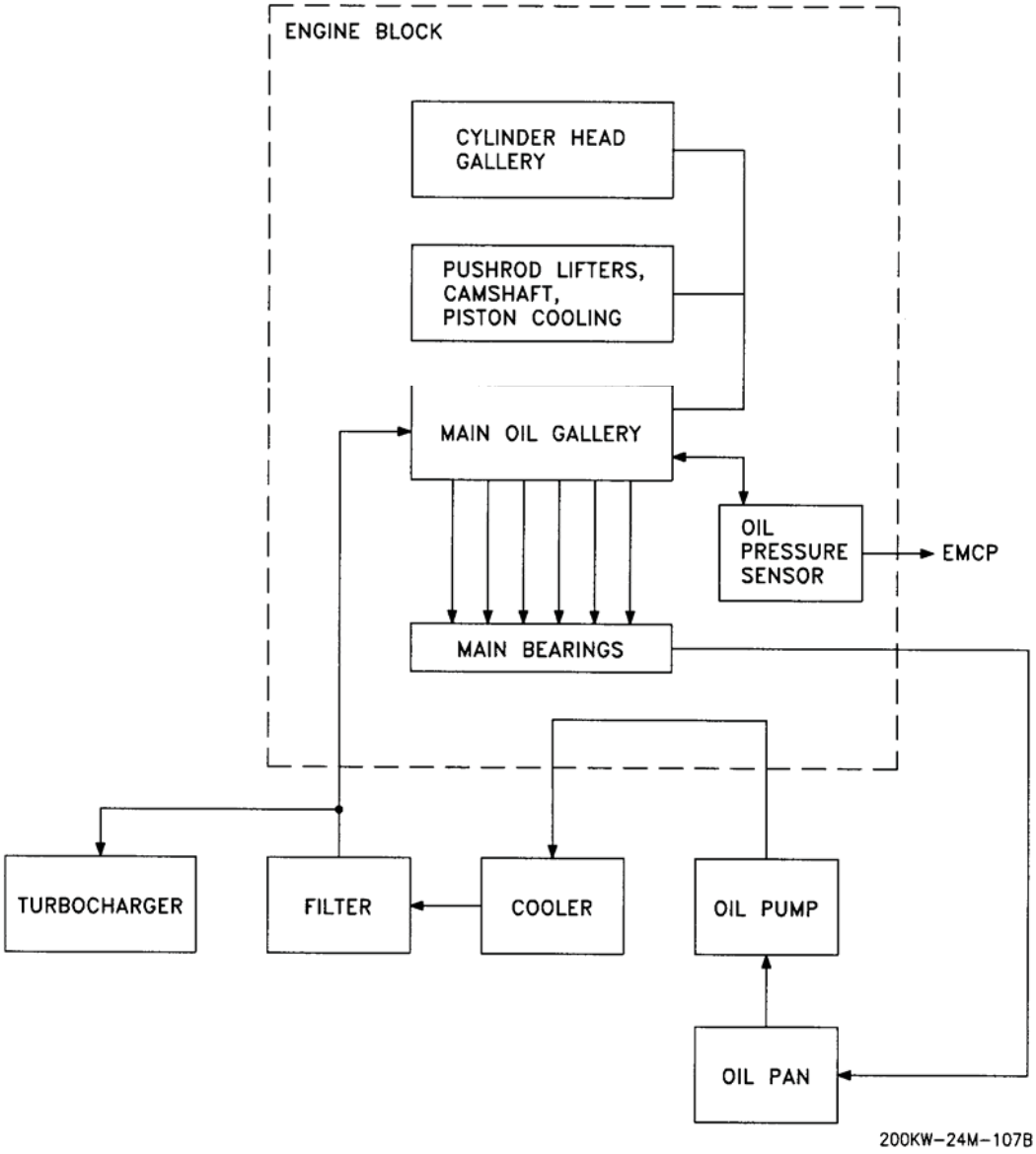

Figure 5. Engine Lubrication System.

LUBRICATION SYSTEM - Continued

Engine Lubrication

The engine oil pump is mounted to the bottom of the cylinder block inside the engine oil pan. The engine oil pump pulls oil from engine oil pan and pushes the oil through the passage to the engine oil cooler and filter. The filtered oil then enters the turbocharger oil supply line and main oil gallery. The main oil gallery distributes oil to main bearings, piston cooling jets, and the camshaft bearing. Oil from the main oil gallery exits the front of the block and enters a groove that is cast in the front housing. Oil enters the crankshaft through holes in the bearing surfaces (journals) for the main bearing. Passages connect the bearing surface for the main bearing with the bearing surface for the connecting rod. The front housing passage sends the oil flow in two directions. At the upper end of the passage, oil is directed back into the block and up to cylinder head gallery through passage to the rocker arm mechanism. Internal passages lubricate the oil pump idler gear bearing and camshaft idler gear bearing. Oil passages in the crankshaft send oil from all the main bearings through the connecting rods to the connecting rod bearings. The passages send oil from the camshaft bearing to pushrod lifters.

AIR INLET AND EXHAUST SYSTEM

The air inlet and exhaust system (Figure 6) consists of an air filter assembly, intake manifold, turbocharger, exhaust manifold and muffler. Ambient air is drawn into the air filter assembly where it passes through the filter elements. Airborne dirt is removed and trapped in the elements. Filtered air is drawn out of the air filter assembly through air intake tubes to the turbocharger where it is pressurized and passed through an aftercooler coil in the radiator. In cold weather, an ether starting aid is used to accelerate combustion The pressurized inlet air enters the intake manifold to the combustion chambers and mixes with fuel from the fuel injectors. The engine exhaust gases are released into the turbocharger, which is mounted on the exhaust manifold. The exhaust gases drive the turbocharger, forcing large amounts of air into the intake manifold. After passing through the turbocharger, the exhaust gases are channeled into a muffler to deaden the sound. The exhaust gases are vented upward from the generator set housing.

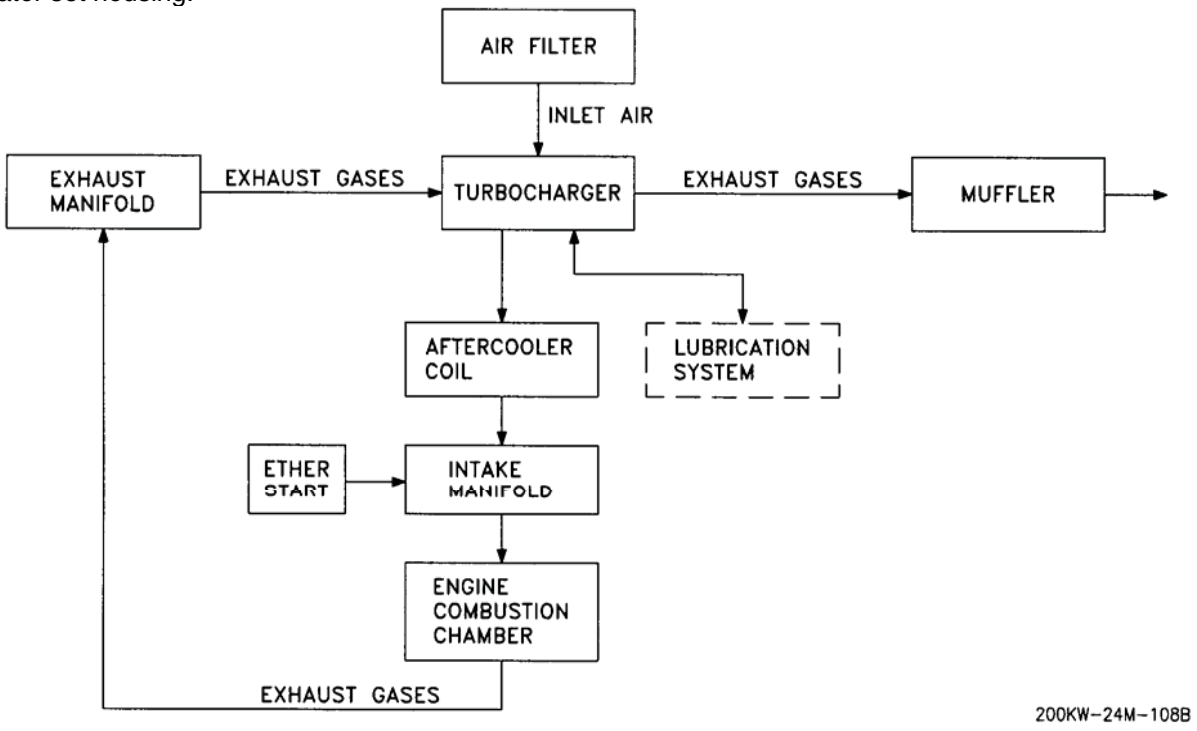

Figure 6. Air Inlet and Exhaust System.

AIR INLET AND EXHAUST SYSTEM - Continued

The components of the air inlet and exhaust system control the quality of the air that is available for combustion. These components also control the amount of the air that is available for combustion. Inlet air is pulled through the air cleaner. The inlet air is then compressed and heated by the compressor wheel of turbocharger to about 150°C (300°F). The inlet air is then pushed through the air-to-air aftercooler core and the inlet air is moved to air inlet where the temperature about 110°F (43°C). Cooling the inlet air increases the combustion efficiency which lowers fuel consumption and increases horsepower output. The aftercooler core is a separate cooler core installed above the standard core of the engine radiator. The engine fan moves air at ambient temperature across the aftercooler core to cool the turbocharged inlet air. From the aftercooler core the air is forced into the cylinder head to fill the inlet ports. The inlet valves control air flow from the inlet port into the cylinder. There are two inlet valves and two exhaust valves for each cylinder. Inlet valves open when the piston moves down on the inlet stroke to pull air into the cylinder. The inlet valves close and the piston begins to move up on the compression stroke. The air in the cylinder is compressed and fuel is injected into the cylinder. The fuel mixes with the air and combustion starts. During the power stroke, the combustion force pushes the piston downward. Then the piston moves upward in the exhaust stroke. During the exhaust stroke, the exhaust valve opens, and the exhaust gases are pushed through the exhaust port into the exhaust manifold. After the piston completes the exhaust stroke, the exhaust valves close and the cycle starts again. Exhaust gases from exhaust manifold enter the turbine side of turbocharger to turn the turbine wheel. The turbine wheel is connected to a shaft that drives the compressor wheel. Exhaust gases from the turbocharger pass through the exhaust outlet pipe, the muffler and the exhaust stack.

Turbocharger

The turbocharger is installed on the center section of the exhaust manifold. All the exhaust gases from the engine go through the turbocharger. The compressor side of the turbocharger is connected to the aftercooler by pipe. The exhaust gases go into the turbine housing through the exhaust inlet. The exhaust gases spin the blades of a turbine wheel connected by a shaft to a compressor wheel. The rotation of the compressor wheel pulls clean air from the air filters through the compressor housing air inlet to compress the inlet air. Air compression increases engine power by allowing the engine to burn more air and more fuel during combustion. When the load on the engine increases, more fuel is injected into the cylinders producing more exhaust gases to increase the turbocharger speed. As the compressor wheel turns faster, more air is forced into the cylinders. The increased flow of air gives the engine more power by allowing the engine to burn the additional fuel with greater efficiency. The turbocharger uses engine oil under pressure for lubrication. The oil comes in through an oil inlet port, lubricates turbocharger bearings, and returns through an outlet port to the engine lubrication system.

Ether Starting Aid

The ECM uses the coolant temperature sensor signal to determine if ether should be injected. Ether will be injected if the coolant temperature is between -40°F and 50°F (-40°C and 10°C) and engine rpm is between 30 and 1500 rpm. The time duration of the ether injection is a linear function of the temperature. The shortest injection duration (15 seconds) is at the highest temperature and the longest duration (130 seconds) is at the coldest temperature.

AC POWER OUTPUT

The AC output system (Figure 7) consists primarily of the AC generator, the output load terminal board, the voltage reconnection terminal board, the main load contactor and the AC CIRCUIT INTERRUPTER switch on the EMCP. Power created by the AC generator is supplied through the voltage reconnection terminal board and the main load contactor to the output load terminals on the output load terminal board. The voltage reconnection terminal board allows configuration of the generator set for 120/208 volt connections or 240/416 volt connections. The DVR and GSC must be reprogrammed for voltage changes. The AC CIRCUIT INTERRUPTER switch located on the EMCP closes and opens the main load contactor. This enables or interrupts the power flow between the voltage reconnection terminal board and the output load terminals. The main load contactor is also opened automatically during any of the specified set faults. The Digital Voltage Regulator (DVR) module in the

AC POWER OUTPUT - Continued

EMCP senses AC generator output voltage and provides excitation voltage to the AC generator to maintain the desired output voltage. The VOLTAGE adjust potentiometer is connected to the DVR to allow the user to make minor voltage adjustments. The user can select which output load terminals to monitor for current and voltage measurements with the GSC keypad AC METER key. The values and terminals are indicated on the upper and lower displays. Refer to AC POWER DISTRIBUTION for a more detailed discussion.

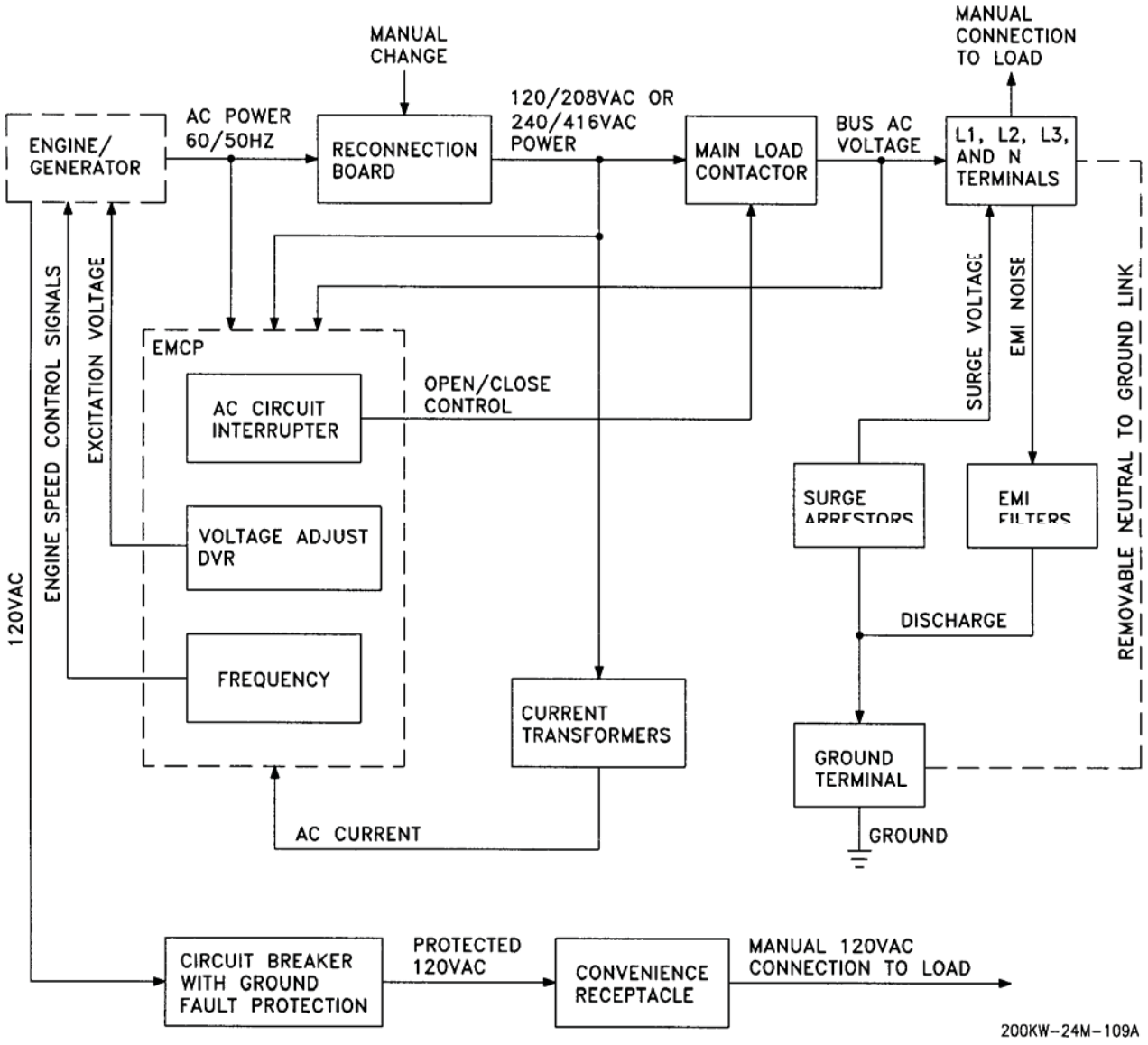

Figure 7. AC Power Output.

DC POWER DISTRIBUTION (FIGURE FO-1, SHEETS 2 AND 3)

The DC battery system (Figure 8) provides 24 Vdc for engine starting and TQG control circuits. The two sets of 12 Vdc batteries are charged by the engine alternator. The DC AMMETER on the EMCP indicates alternator charging rate. Charge rate is shown from -25 to +50 A. Normal operating indication depends on the state of charge in the batteries. A low charge, such as exists immediately after engine starting, will cause a high reading. The battery system includes a manually operated Battery Disconnect Switch to isolate the batteries from the engine. The Battery Disconnect Switch can be used to remove the DC power from the TQG. The batteries connect directly to the 24 Vdc NATO slave receptacle.

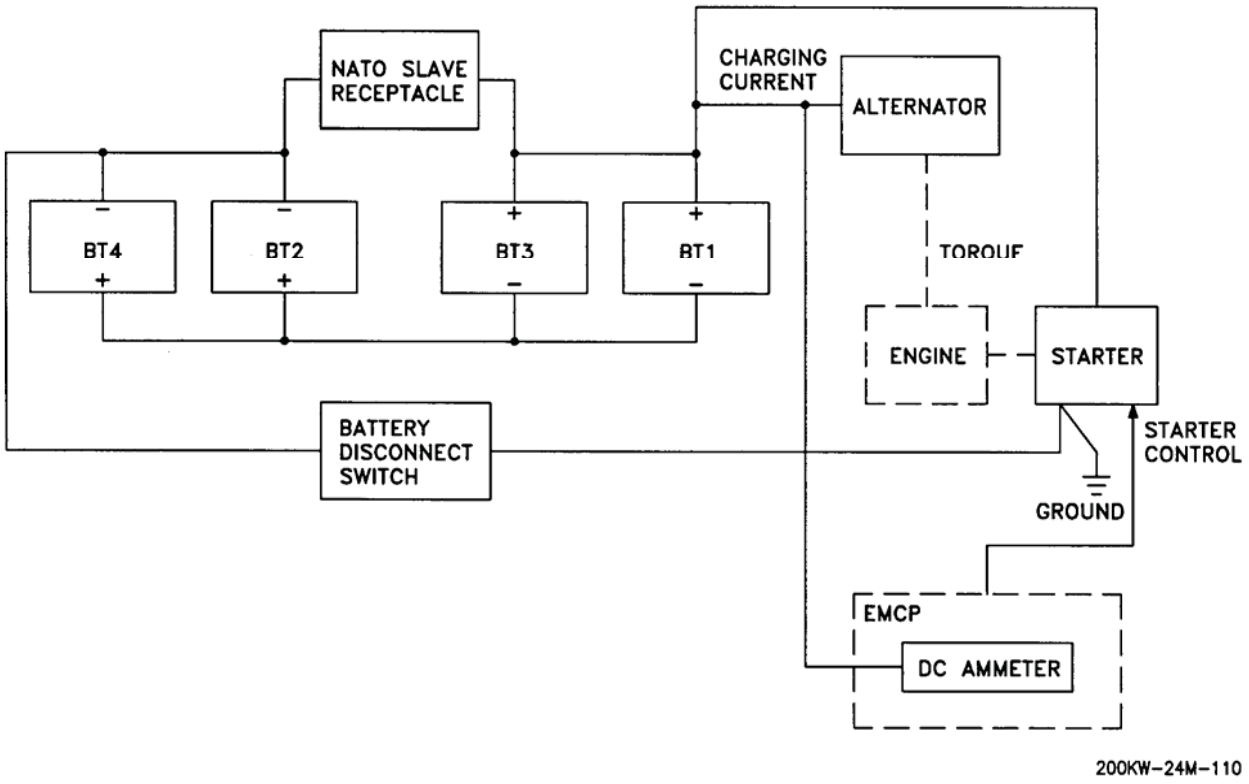

Figure 8. DC Power Distribution.

DC POWER DISTRIBUTION (FIGURE FO-1, SHEETS 2 AND 3) - Continued

Batteries

Batteries BT1 and BT3 are paralleled as are batteries BT2 and BT4. These two sets of 12 Vdc batteries are connected in series to supply 24 Vdc for this system. The DC power distribution system operates on 24 Vdc. The Slave Receptacle (SR) is the NATO connector on the generator set. This is useful for charging the batteries and jumping the generator set with another if the batteries become discharged. The Battery Disconnect Switch disconnects the batteries from everything except the slave receptacle. Battery power goes directly to the starter solenoid (Labeled PS (pinion solenoid) on the schematic) for use when cranking or starting the engine. The batteries are connected to the alternator through shunt R4 and circuit breaker CB-5. R4 generates a voltage for the ammeter, which displays the amperage from the alternator when charging the batteries. Battery power is connected to ECM A8 through circuit breaker CB-4 and relay contacts of slave relay (SRY). SRY is energized any time power is applied to the GSC. Battery power goes through D1 to the common of the DEAD CRANK SWITCH. In OFF, battery power is removed from the GSC, DVR, ECM, and Winterization Kit (if supplied). In NORMAL, battery power is applied to the relay module of the GSC through circuit breaker CB1. Power is distributed to the other equipment by the ECS. In CRANK, +24 Vdc is applied to the Starter Motor Magnetic Switch (SMMS) relay coil. SMMS connects battery voltage to the starter solenoid through circuit breaker CB-2, causing the engine to crank. Since power is not supplied to the electronics, the engine will not start.

Emergency Stop Push Button

The Emergency Stop Push Button (ESPB) (PUSH TO STOP EMERGENCY STOP on EMCP) is there to stop the generator set in an emergency. When pushed, contacts 3 and 4 ground P7-38, which informs the GSC that the switch is pressed. Contacts 1A and 2A remove the ground from the output to the engine controller, which enables the engine to run. This will stop the engine. Contacts 1 and 2 open the circuit between the GSC and relay SMMS so that the GSC will not be able to attempt to crank the engine.

When the ECS is set to START, starter motor relay (SMR) A1 K4 is energized. +24 Vdc is applied through the ESPB (if it is not pressed) and D2 to relay SMMS which enables the starter and cranks the engine. D2 prevents voltage from the DEAD CRANK SWITCH from applying power to Relay Field Flash (KFF) relay.

Field Flash Relay

Relay A1 K4 also applies +24 Vdc to the coil of KFF relay. The contacts of KFF apply the +24 Vdc, which is across the coil of KFF, to the generator field coil input (see FO-1, sheet 4) through a 15 Ohm, 25W resistor and diode CRFF (Diode Field Flash). Note that for the acronyms KFF and CRFF, the common reference designators for a relay (K) and a diode (CR) were used. This excitation voltage starts the generator generating voltage. After the process is started, it is self sustaining.

Electronic Governor Relay (EGR) Comm Data Links, MPU, CTR, and GFR

The Electronic Governor Relay (EGR) output of the GSC is connected to the engine controller. This output enables the engine to run. P7-21 and 22 are the Communications Data Link between the GSC and the Communication Module (CM). P7-1 and 2 are the inputs from the engine Magnetic Pickup Unit (MPU). This pickup measures speed of rotation of the engine by detecting the starter ring gear teeth. This input is a frequency proportional to engine speed. P7-19 and 20 are the Communications Data Link between the GSC and the electronic control module on the engine. (This is also known as the CAT Data Link.) A1 F1 (Labeled F1 GSC on schematic), and the GSC relay contacts labeled CTR are not used. P7-23 is a low fuel level input from the low fuel level sensor connected to Alarm Module A2 (FO-1, sheet 3). This input is connected to ground when the fuel tank is almost empty. The 10A fuse between RM-34 and RM-7 is A1 F5. The Generator Fault Relay (GFR) K2 in the GSC closes when the GSC detects a generator fault. This energizes the GFR external to the GSC. The contacts for the GFR are used to de-energize K1 and disconnect the load from Generator G1.

DC POWER DISTRIBUTION (FIGURE FO-1, SHEETS 2 AND 3) - Continued

Engine Control Switch (ECS)

The ECS consists of two sections. One section consists of pins 1, 2, 3, 4, and 5; the other section consists of pins 6, 7, 8, 9 and 10 of the switch. There is a legend on the schematic that describes which contacts are closed in which positions of the switch. Pins 6 thru 10 apply power to the GSC, Overload and Short Circuit (OL/SC) module, and DVR whenever the switch is not in OFF. This allows the OFF position of this switch to reset any alarms that have occurred. Shorting pins RM 1 and RM 2 on the GSC does this. Note the internal relay connections in the GSC between pins RM 1 and RM 2. This is to ensure that power can not be removed from the GSC when the Fuel Control Relay (FCR) A1 K7 is energized (signifying the engine is running) or the Crank Termination Relay (CTR) A1 K3 is active (signifying that the engine is running and the starter can be released). Pins 1 thru 5 ground a different input line to the GSC for each position of the switch, telling the GSC what to do.

Power to ECM, DVR, OL/SC, Fuel Gauge, Panel Lights, Winterization Kit

Fuse F10 shown between RM 1 and RM 10 is A1 F10 on the back of the GSC. This connects +24 Vdc to pin RM 39 whenever the ENGINE CONTROL switch is in any position other than OFF. Slave Relay (SRY) is connected to RM 39 and is powered up any time the ECS is not in OFF. The contacts of SRY apply +24 Vdc from the battery to ECM A8. Power to DVR A3 module also comes from RM 39. Power to the OL/SC module comes from RM 1 through a set of normally closed contacts on relay AR. AR is energized when the LAMP TEST button is pressed on Alarm Module A2. The fuel gauge (FLG) is connected to RM 39 for power. The signal comes from the fuel sending unit (FLSU) in the fuel tank. The panel lights get their power from RM2, which has power whenever the DEAD CRANK SWITCH is set to NORMAL. Closing the PANEL LIGHT switch (PLS) applies power to the lights.

Power to the optional winterization system is applied whenever the DEAD CRANK SWITCH is set to NORMAL. If the winterization kit is turned on at its control panel, +24 Vdc is output to TB5-15. This applies power to the two resistor heaters used to keep the LCD displays in the GSC and the DVR from freezing. There is also a thermally operated switch in the control panel that closes when the temperature falls below -20°F ±10°F (-28.9°C ±5.6°C). This switch applies +24 Vdc from TB4-17 to the resistors used to keep the LCD displays in the GSC and the DVR from freezing. Note that this power is only available when the ECS is not in OFF.

Coolant Low Sensor Interface

Pins P7-7, 8, 9, 13, 14, 24, 30, and 31 are connected between the GSC and connector J37. P7-9 is +8 Vdc power for the Coolant Low sensor. P7-31 is power return. P7-13 is the Coolant Low signal from the sensor. This sensor detects presence or absence of coolant in the engine and provides an output indicating that the coolant level is dangerously low to allow an operator to add coolant before a forced shutdown occurs.

Load Sharing Module (LSM) A4

The LSM gets an input from the Speed Setting Potentiometer (SSP) (labeled FREQUENCY on the front panel). This signal allows the generator frequency to be adjusted ±10% of nominal. There is a SYNC input on pins 24 and 25 from the GSC. This signal is output on LSM Pins 10 and 11 if this generator is connected to a dead load bus and in AUTO or SEMI-AUTO sync mode. Otherwise, pins 10 and 11 are an input. Pins 10 and 11 are connected to J32 and J33 through contacts on the paralleling relay (PAR). J32 and J33 are the paralleling cable connectors on the rear of the generator set near the control panel. In parallel operation, cables interconnect all of the paralleled generators and these ports are all in parallel. Pins 19 and 20 are a serial communication port to the ECM via J37. Pins 15 and 16 are power and ground respectively.

DC POWER DISTRIBUTION (FIGURE FO-1, SHEETS 2 AND 3) - Continued

Alarm Module A2

The alarm module monitors three conditions: Low Fuel, Overload (current), and Short Circuit (OL/SC). The Low Fuel condition is monitored by fuel level switch FL1 in the fuel tank and a set of contacts close when the fuel tank is almost empty. This lights a red lamp on the alarm panel and sounds the alarm buzzer. The lamp will flash at two cycles per second. Pressing the Alarm Silence button on the alarm module will silence the buzzer. This Low Fuel signal is also connected to the GSC at P7-23 (SP-1 input) to notify the GSC that the fuel tank is almost empty. The OL/SC module monitors the Overload and Short Circuit conditions. (The AC Power Distribution discussion describes the module functions.) A set of relay contacts for each condition is input to this panel and each lights a yellow lamp. These conditions do not sound the buzzer. There is a relay coil (AR) connected to the LAMP TEST input/output of the alarm panel. When the LAMP TEST button on the panel is pressed, this relay is energized. The contacts (FO-1, sheet 2) remove power from the OL/SC module when the relay is energized. This resets the output relays and any condition sensed by this module. Power for this module is on pins 1 and 7.

Dead Bus Hi/Lo Inputs

Spare input SP-4 at P7-29 is connected to ground through a set of contacts on Dead Bus High (DBHI) and a set of contacts on Dead Bus Low (DBLO). If there is no voltage on the load bus, DBLO and DBHI will both be de-energized and the contacts used here will both be closed, grounding P7-29. This input is monitored to verify the condition of the load bus. A ground here indicates that there is no voltage on the load bus. This input is compared against the AC voltage monitored at P7-17 and P7-18. If both signals indicate a dead bus, the AUTO mode will close the load contactor onto the dead bus automatically.

BATTLE SHORT Switch (BSS) Input to ECM

One set of contacts on the BSS is connected to the ECM. This is to notify the ECM when the system is in the Battle Short Mode. In this mode, shutdown conditions are locked out except for Short Circuit Over Speed.

Auxiliary Fuel Pump Circuit

The AUX FUEL switch on the control panel is labeled AFPS (Auxiliary Fuel Pump Switch) on the schematic. The ON position is when terminal 1 and 2 are connected together. The OFF position is when terminals 2 and 3 are connected together. When the AUX FUEL switch is ON, fuel level sensors FL2A and FL2B in the fuel tank control the Auxiliary Fuel Pump Relay (AFPR). When the fuel level in the tank gets low, FL2A and FL2B will be closed, applying power to relay AFPR. One set of contacts on AFPR latch, keeping AFPR energized. Another set of contacts on AFPR apply 24 Vdc to the auxiliary fuel pump. The auxiliary fuel pump will transfer fuel from an external tank to fill the internal tank in the generator set. As the fuel level rises in the tank, FL2B will open. The pump will continue transferring fuel since a set of contacts on AFPR latches the relay to the ON condition. When the fuel level gets to FL2A, those contacts will open. AFPR will drop out and the transfer pump will stop.

DC POWER DISTRIBUTION (FIGURE FO-1, SHEETS 2 AND 3) - Continued

SYNC MODE Switch (SMS)

The SYNC MODE switch has three sections and four positions for the four sync modes: OFF, SEMI-AUTO, AUTO, and PERMISSIVE. OFF is used when not paralleling generator sets, the other modes are for paralleling. The first section controls the AUTO SYNC input to the GSC. The AUTO SYNC input to the GSC is grounded in AUTO and PERMISSIVE modes. When grounded, this input enables the automatic synchronization of Generator G1 with the load bus. The second section controls the SYNC CHECK input to the GSC. The SYNC CHECK input to the GSC is grounded in SEMI-AUTO and PERMISSIVE. When grounded, this input enables the synchroscope function on the GSC. The third section is integrated with the opening and closing of the load contactor K1 and is discussed more fully with K1 operation. Note that SEMI-AUTO and PERMISSIVE are wired together.

Load Contactor K1, K1 Relay (KR), and Contactor Control Switch (CCS) aka AC CIRCUIT INTERRUPTER Switch

Load contactor K1 is controlled by K1 Relay (KR), GSC Run Relay (RR) A1 K5, and GSC Programmable Spare Relay (PSR) A1 K8. GSC PSR (A1 K8) is programmed to close whenever there are no alarm conditions sensed by the GSC. When the ENGINE CONTROL switch (ECS) is placed in START (or in AUTO and a remote start command is received), the GSC closes RR (A1 K5). The fuse labeled F7GSC is actually A1 F6. Note that the GSC checks to be sure there are no faults present prior to closing RR and verifies that all previous faults have been reset, otherwise RR will not be closed. As long as no faults are detected, PSR will also be closed. The cool down relay (CDR) is normally closed and opens at the start of Cool-down Mode. Under these conditions, +24 Vdc is connected to relay KR. The SC contacts will be closed unless the OL/SC module detects a short circuit condition. These contacts are reset to closed by turning the engine control switch to OFF/RESET or pushing the LAMP TEST button on Alarm Module A2. The battle short switch shorts across the next two contacts to disable them in Battle Short Mode. The Generator Fault Relay contacts are normally closed and open when the GSC detects a generator fault condition. The OL contacts will be closed unless the OL/SC module detects an overload condition. These contacts are reset to closed by turning the ENGINE CONTROL switch to OFF/RESET or pushing the LAMP TEST button on Alarm Module A2.

If the PARALLEL/UNIT switch is set to UNIT, setting the AC CIRCUIT INTERRUPTER switch to CLOSED will apply ground to KR, which will close Load Contactor K1, as long as DBHI and DBLO are closed. Auxiliary contacts on K1 latches KR on after KR is energized. DBHI and DBLO are relays on the final generator output (after the load contactor K1) which monitor the output for presence of voltage. If there is no voltage on the load bus, these relay contacts will be closed. If either 208 or 416 Vac are detected by these relays, one or the other contacts will be open and closing of the AC CIRCUIT INTERRUPTER switch will not apply ground to KR. This will inhibit closing the Load Contactor K1. Note that DBHI and DBLO have no affect after KR is latched on.

NOTE

Electrically, if the SYNC MODE switch is in AUTO, it does not matter which position the PARALLEL/UNIT switch is in.

If the PARALLEL/UNIT switch is set to PARALLEL and SYNC MODE switch set to AUTO, GSC can apply ground to relay KR by grounding the CLOSE BREAKER output. Auxiliary contacts on K1 latch KR on after KR is energized.

DC POWER DISTRIBUTION (FIGURE FO-1, SHEETS 2 AND 3) - Continued

If the PARALLEL/UNIT switch is set to PARALLEL and SYNC MODE switch is in SEMI-AUTO or PERMISSIVE, the CLOSE BREAKER output (P7-37) becomes an enable signal. Closing the AC CIRCUIT INTERRUPTER switch will not apply ground to KR unless the GSC has activated the CLOSE BREAKER output. Auxiliary contacts on K1 latches KR on after KR is energized. A set of auxiliary contacts on KR energizes K1. During operation, run relay (RR) A1 K5 is energized until after cool down mode when the GSC opens the electronic governor relay (EGR) on the GSC to stop the engine, then RR is opened also. When ENGINE CONTROL is set to COOL DOWN/STOP, the GSC spare output at P7-36 is grounded and relay CDR (cool down relay) is energized. The contacts of CDR are in series with relay KR and drop out KR, which drops out K1. The generator set runs for 5 minutes (programmable) and then shuts down the engine by opening the electronic governor relay (EGR) on the GSC.

The short circuit (SC) and overload (OL) contacts are part of the OL/SC module. In the event the output current goes above 130% of maximum (overload condition) or 400% of maximum (short circuit condition) the appropriate contacts will open, de-energizing KR and K1. This will disconnect the load. The GSC directly controls the Generator Fault Relay (GFR). If the GSC detects a generator fault, the GFR output energizes the GFR relay and KR and K1 are de-energized, disconnecting the load from Generator G1. The paralleling relay (PAR) is connected to an auxiliary set of contacts on K1 only when the PARALLEL/UNIT switch is in PARALLEL. Contacts on the paralleling relay connect Load Sharing Module (LSM) A4 to the paralleling connectors and hence to the LSM in all other generators in parallel. The press-to-test lamp above the AC Interrupt switch is connected to a set of auxiliary contacts from K1 to indicate when K1 is energized. A line from this connection goes to a spare input of the GSC (P7-25) to tell it that K1 is closed.

AC POWER DISTRIBUTION (FIGURE FO-1, SHEETS 4 AND 5)

Generator G1

Generator G1 is a three phase Y-connected generator with two sets of coils. When these coils are placed in parallel, the generator is capable of 208 Vac phase-to-phase and 120 Vac any phase-to-ground. If connected in series the generator will put out 416 Vac phase-to-phase and 240 Vac any phase-to-ground. The Reconnection Board TB1 does this changeover from series to parallel connection. The reconnection board (FO-1, sheet 4) is shown pictorially rather than schematically. Note that the references T3, T6, etc. relate to the numbers on the generator output wires. They are labeled 3, 6, etc correlating with T3, T6, etc. Electrically, T3 is connected to Reconnection Board TB1 terminal labeled 3, T6 is connected to Reconnection Board TB1 terminal labeled 6, etc. There are metal bus bars riveted to Reconnection Board TB1 that short between the generator wires in order to connect the generator coils in parallel for 120/208 mode or in series for 240/416 mode. The bus bars are shown in dotted lines on the schematic. There is also a bus bar connecting terminals labeled 10, 11, 12, and 13. These are all connected to the common wire #10 (Ground) and wire 110 coming in and going out of Reconnection Board TB1.

The output of Reconnection Board TB1 goes through several current transformers, relay K1 (shown as a circuit breaker) and then to Load Connection Board TB2. The coil of K1 is shown on the DC circuits (FO-1, sheet 2 and sheet 3). There are filters and varisters connected between the outputs and chassis ground. A removable jumper on the Load Connection Board TB2 connects the chassis ground (which will be externally connected to a grounding rod) and the neutral line out of the generator.

AC POWER DISTRIBUTION (FIGURE FO-1, SHEETS 4 AND 5) - Continued

Digital Voltage Regulator (DVR) A3

DVR A3 monitors the output of Generator G1 prior to Reconnection Board TB1 and regulates the output of the generator according to the parameters programmed into it. The voltage from wires G1-7, G1-8, and G1-9 is connected to the DVR. Also, PT2 measures the voltage between G1-7 and G1-8, divides the voltage in half, and connects this to the DVR. PT3 is the same as PT2, except measures the voltage between G1-8 and G1-9. Fuses F1, F2, and F3 protect PT2 and PT3. Whether the generator is connected for 208 or 416 Vac output, the DVR is monitoring the same voltage. Current transformer CCCT monitors the current in wire G1-8 and G1-2 from the generator. This total current will not change whether the generator is connected for 208 or 416 Vac output. CCCT generates a voltage across a 1 ohm resistor A7R2 at a rate of 1.25 Vac per 200A. The voltage across this 1 ohm resistor is input to the DVR. Rheostat VAR (Voltage Adjust Rheostat) is connected to the DVR to allow the operator to adjust the voltage approximately ±10%. (This control is labeled VOLTAGE on the front panel.) Power for the DVR comes from the battery (FO-1, sheet 2 and sheet 4). The DVR monitors the output voltage from the generator and applies a voltage to the field coil (F+ and F-) on the generator in order to regulate the output voltage of the generator. Essentially, the higher the voltage applied to the field, the higher the output voltage of the generator. The nominal voltage across this coil is 4.6 Vdc at no load and approximately 14 Vdc at full load. The voltage for the field coil actually comes from the generator output through PT2 and PT3. Because of this, a Field Flash circuit provides an excitation at the initial startup of the generator set to start this process. The connections J and K to the field coil circuit come from the Field Flash circuit (FO-1, sheet 2). This circuit provides an initial voltage excitation to the field in order to get an initial output from the generator. Without this excitation the generator will not produce power capable of supplying a load.

Load Sharing Module (LSM) A4

Three current transformers CT-7, CT-8, and CT-9, monitor the current from the generator and supply input signals to LSM A4 and the overload (O/L) and short circuit (S/C) module. The output of each current transformer goes through a resistance on LSM A4, then through a resistance on the O/L and S/C module. A voltage is generated across the input of each module for control purposes. LSM A4 is also connected to lines G1-7, G1-8, and G1-9 from the generator and monitors the voltage out of Generator G1 before Reconnection Board TB1. The paralleling input (pins 10, 11, and 12) is repeated completely in the DC circuits (FO-1, sheet 3) and was discussed there. The ISOCHRONOUS/DROOP switch is connected to LSM A4 through an auxiliary set of contacts on relay K1.

Ground Fault Circuit Interrupter (GFCI)

The GFCI picks up one phase (G1-9) from Generator G1 before Reconnection Board TB1 and connects 120 Vac to a standard 2 gang outlet on the rear of the generator set next to the control panel. This is for a trouble light or other auxiliary components.

GSC Voltage and Current Monitoring

Three current transformers (CT1, CT2, and CT3) measure the current out of Generator G1 after Reconnection Board TB1. The outputs of these current transformers are connected to three transformers located on AC Transformer Box (ATB) A5. The outputs of these transformers go to the GSC for monitoring Generator G1 output current. Lines G1-1, G1-2, and G1-3 from Generator G1 output, after Reconnection Board TB1, are connected to transformers T1, T2, and T3 on ATB A5 through protection fuses. The outputs of these transformers are connected to the GSC for monitoring the output voltage of Generator G1. There are two transformers (T1 and T2) on Bus Transformer Box (BTB) A6. These monitor the load bus voltage on the output after load contactor K1; and their outputs are connected to the GSC. The inputs are fused for protection.

AC POWER DISTRIBUTION (FIGURE FO-1, SHEETS 4 AND 5) - Continued

Dead Bus Low (DBLO) and Dead Bus High (DBHI) Monitoring

Relay DBHI is connected after Load Contactor K1 between L1 and L3 (K1A2 to J31-19 and K1 B2 to J31-8) to monitor for voltage on the load bus (the output of the generator set). DBLO energizes if 208 Vac is present on the load bus. DBHI energizes if 416 Vac is detected on the load bus. R3 reduces the voltage seen by the 230 Vac coil of DBHI so that it will only energize if it sees 416 Vac. DBHI will not energize at 208 Vac. One set of contacts on DBHI is used to remove the 416 Vac from the coil of DBLO in order to protect the coil from excessive voltage. The other contacts for DBLO and DBHI are discussed as part of the DC Power Distribution discussion.

Overload and Short Circuit (OL/SC) Module

The OL/SC module gets a current input from current transformers CT-7, CT-8, and CT-9, which are connected before Reconnection Board TB1. This module monitors the output current and provides two sets of relay contacts for overload condition and two relay contacts for short circuit condition. Overload condition is defined as an output current over 130% of the maximum current rating of Generator G1. Short circuit is defined as an output current over 400% of the maximum current rating of Generator G1. The relay outputs of the module latch after a condition has been sensed. Setting ENGINE CONTROL to OFF/RESET will reset the latched relays on this module. Also pressing the LAMP TEST button on Alarm Module A2 will reset the relays on this module. An overload or short circuit condition causes an alarm on the alarm module and disconnects the load from Generator G1. The overload condition is disabled in Battle Short mode. The relay contacts and the power input connections for the OL/SC module are shown in the AC circuit, but the use is discussed as part of the DC Power Distribution discussion. In the DC schematic, the OL/SC contacts are separate and labeled O/L and S/C respectively.

ELECTRONIC MODULAR CONTROL PANEL (EMCP)

The Electronic Modular Control Panel (EMCP) incorporates Generator Set Control A1 (GSC), Alarm Module A2, Digital Voltage Regulator (DVR) A3, the Load Sharing Module (LSM) A4, Resistor Assembly A7, a relay module, panel switches and controls, and various terminal boards.

GENERATOR SET CONTROL (GSC)

GSC Inputs

The GSC (Figure 9) is a microprocessor based control system which accepts programmed values, switch inputs, data from ECM A8, and data from LSM A4 to control the speed of the engine. A constant engine speed maintains the desired output frequency. The GSC inputs to the Central Processing Unit (CPU) include signals from panel controls including touch pad inputs, ENGINE CONTROL switch settings, SYNC MODE switch setting, and the PUSH TO STOP EMERGENCY STOP switch. External signals are input from engine sensors, generator output voltage and current samples, load bus voltage samples and the ECM. LSM A4 interacts with the GSC as well. The touch pad allows inputting parameters into the GSC to determine the desired output voltage and frequency, and how the GSC reacts to various stimuli. The touch pad also allows the user to display all of the voltages, currents, and calculated power levels, real and reactive as desired. The generator output voltage, current, and the load bus voltage are all monitored and can be displayed as desired on the EMCP displays. LSM A4 monitors the load that the generator powers and allows fine tuning of the load sharing via a speed setting potentiometer. The LSM sends a speed correction signal to the GSC in order to fine tune the speed based on the load sharing of the generator. This is utilized primarily when the generator set is in parallel with another generator. Most engine sensors are connected to the engine control unit and their status transmitted to the GSC via the CAT Data Link. One engine speed sensor and a low fuel level sensor are directly connected to the GSC. The engine speed sensor provides positive feedback to the GSC that the engine is operating at the desired speed. The low fuel

GENERATOR SET CONTROL (GSC) - Continued

sensor initiates a controlled shutdown before the engine runs out of fuel. The ENGINE CONTROL switch determines whether the engine is to start, stop, or run. The SYNC MODE switch (called System Mode Switch (SMS) in electrical descriptions) determines the mode of operation with regards to the paralleling capability. The PUSH TO STOP EMERGENCY STOP pushbutton (also called Emergency Stop Push Button (ESPB)) immediately stops the engine and should only be used in an emergency. ECM sends alarm signals to the GSC for any sensors that are directly connected to the ECM.

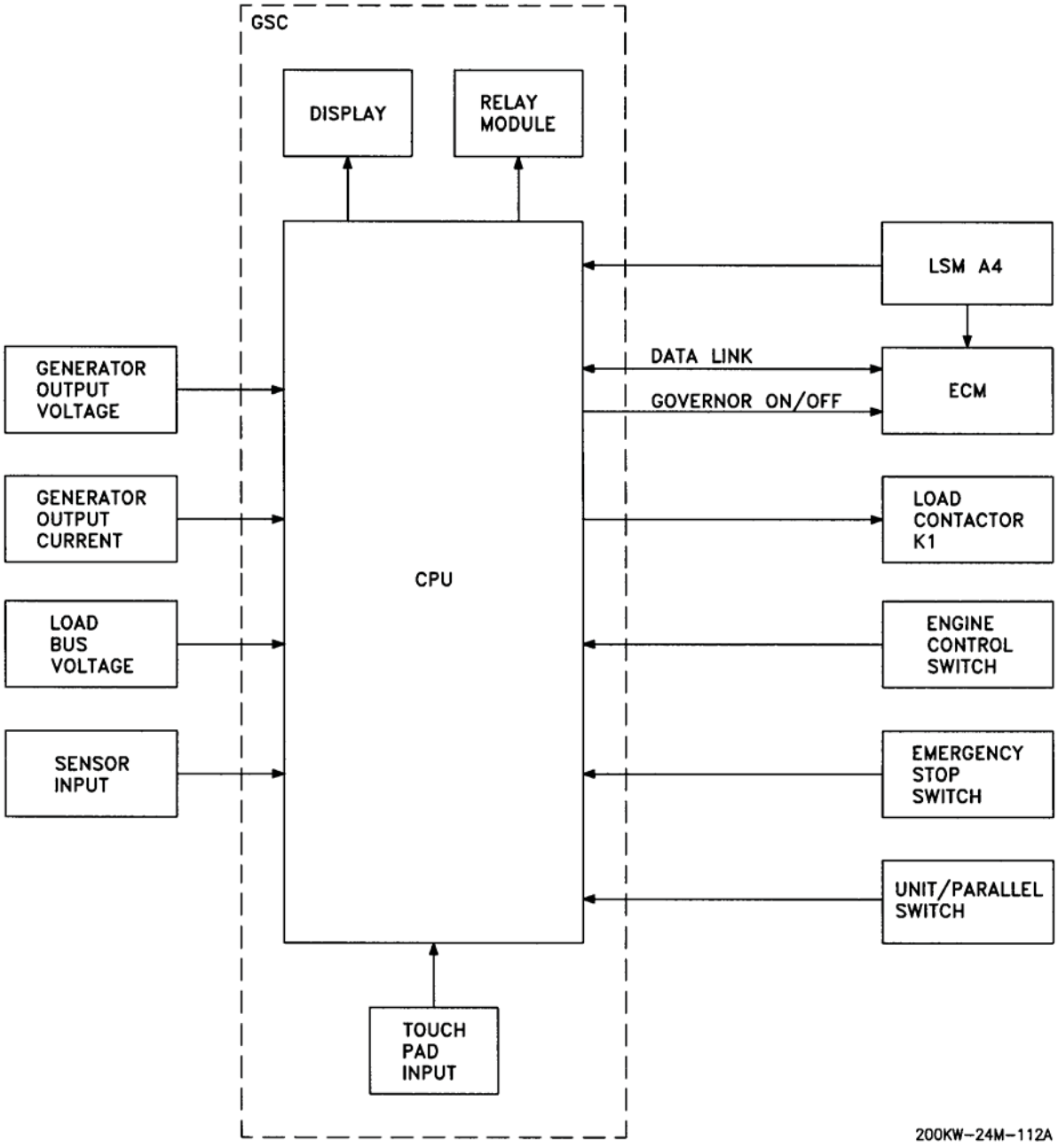

Figure 9. Generator Set Control.

GENERATOR SET CONTROL (GSC) - Continued

GSC Outputs

The GSC outputs signals to the display, the ECM, Load Contactor K1, and the EMCP relay module. The GSC display consists of an upper display, a lower display, and a column of indicators to the left of the upper and lower displays. The upper display shows the average voltage, frequency, and total current the generator set is putting out. By pressing the AC METER key on the touch pad, the upper display can display: line-to-line voltage, generator frequency, and current for each phase; voltage line-to-line for all three phases; line current for all three phases at once; or voltage line-neutral for all three phases at once. The upper display is also used to display any fault codes identified by the GSC or by the ECM.

GSC Displays

The GSC lower display is capable of displaying one of the following:

Total Real Power (kW)
Total reactive power (KVAR)
Total apparent power (kVA)
Percentage of rated power (%kW)
Power factor (average)
Total energy output (kW/h)
Total reactive energy output (kVARHr)
Real Power Phase A (kW)
Real Power Phase B (kW)
Real Power Phase C (kW)
Power Factor Phase A
Power Factor Phase B
Power Factor Phase C

The lower display also has a series of arrows pointing downward to symbols printed below the display. These arrows appear in order to indicate alarm conditions sensed by the GSC and/or ECM. The lower display also lights up designations K1, K2, etc to indicate the condition of relays K1 through K8 in the relay module internal to the GSC (Table 1). When a particular symbol appears, the associated relay is energized. This is strictly status and is helpful when troubleshooting. An additional feature of the lower display is that of a synchroscope. When manually synchronizing the generator output to another generator, the phase relationship between the generator and the voltage on the load bus are shown graphically on the lower display. This allows the two systems to be brought in sync before bringing the generator on line.

The column of indicators at the left side of the GSC indicate impending problems or what condition caused a shutdown. The ECM resides on the engine and controls the operation of the engine, such as starting, stopping, speed control through fuel control, ignition timing, and monitors various sensors on the engine. Problems diagnosed by the ECM are sent via the CAT Data Link to the GSC and displayed on the GSC display with an E suffix to identify them as engine diagnosed. The GSC sends a speed control signal and a governor on/off signal to the ECM to control the speed of the engine, which determines the frequency of the output from the generator. The GSC monitors various sensor outputs, plus the ECM sensors to enable or disable connecting the generator to the load via Load Contactor K1. The GSC is also able to disconnect the generator from the load via Load Contactor K1 in the event that the ECM or the GSC detects a failure that would keep the generator set from performing its duty.

The GSC is a multi-purpose controller meant to be interfaced with a wide range of engine types and configurations. The output from the GSC goes to a relay module inside the GSC and these relay outputs are interconnected to the rest of the control system (refer to DC Power Distribution discussion for this interface). There are also spare inputs and outputs described in the DC Power Distribution discussion. One of the purposes of the GSC is to determine when the generator output is synchronized well enough with the voltage on the load bus in order to connect the generator to the load. This can be done automatically or manually with the aid of the synchroscope feature of the GSC.

GENERATOR SET CONTROL (GSC) - Continued

Table 1. GSC Display Relay Identification.

RELAY	NAME	LIGHTS WHEN
K1	Electronic Governor Relay (EGR)	On whenever ECM is enabled (engine is running). (Output is not used) Internal connection shorts across ENGINE CONTROL switch so that power can not be removed from GSC while engine is running.
K2	Generator Fault Relay (GFR)	On when a generator fault is detected. Engaged to disconnect the load.
K3	Crank Termination Relay (CTR)	On when the engine is running on its own (and the starter should be released). Output is not used.
K4	Starting Motor Relay (SMR)	After ENGINE CONTROL is set to START, K4 is on while starter is cranking. Goes out after 10 seconds or after engine is detected as running. If engine does not start, light goes off for 10 seconds, then comes back on for 10 seconds trying again to start the engine.
K5	Run Relay (RR)	On whenever the engine should be running.
K6	Air Shut Off Relay (ASR)	On during fault shutdowns. Not used.
K7	Fuel Control Relay (FCR)	On when engine should be running. Output not used. Internal connection shorts across ENGINE CONTROL switch so that power can not be removed from GSC while engine is running.
K8	Programmable Spare Relay (PSR)	On when alarm condition occurs that would cause the GSC to disconnect the load.

DIGITAL VOLTAGE REGULATOR (DVR A3) MODULE

DVR A3 (Figure 10) is a microprocessor based, digital voltage regulator. The regulator is specifically designed to regulate the output voltage of a generator in an engine/generator set arrangement. The DVR consists of a touch pad, digital display, CPU, voltage and current monitoring circuits and field drive circuits.

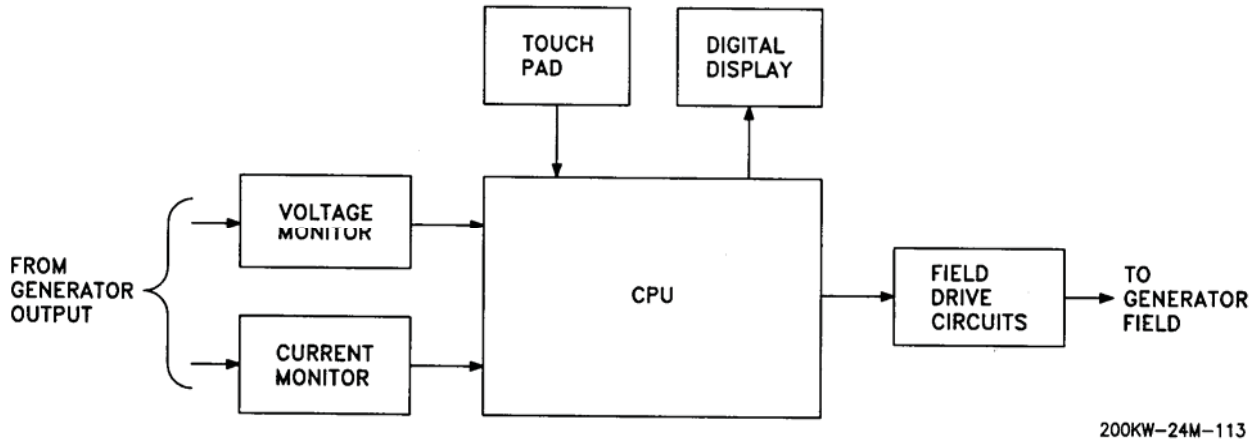

Figure 10. Digital Voltage Regulator.

Touch Pad and Digital Display

The touch pad allows the user to input operating and alarm parameters into the DVR and to check alarm conditions past and present. When power is applied, :01 is displayed. This is the generator output Voltage Parameter. The touch pad allows the user to access the following data, which is displayed on the digital display:

- Voltage
- Frequency
- Current
- Reactive Output Power
- Generator Real Current
- Exciter Field Current
- 3 Phase kVAR
- Hours
- Software ID
- Latest Fault
- Previous Fault

CPU

The CPU contains the program which monitors generator output voltage and current, determines how much drive current to supply the generator field in order to maintain desired output voltage, and monitors generator operation. Alarm conditions are displayed on the digital display.

Voltage and Current Monitoring Circuits and Field Drive Circuits

The generator output is monitored for voltage and current. This data is input to the CPU where the data is compared to the desired output from the generator. The field drive circuits provide field excitation current for the generator, which regulates the output voltage of the generator.

DIGITAL VOLTAGE REGULATOR (DVR A3) MODULE - Continued

Startup Profile

The DVR operates under one of two operational profiles. When the DVR senses that the generator is starting to produce voltage, the Startup profile is used. When the output frequency has increased above the knee frequency (programmable), the DVR will switch over to the Loading and Stopping profile.

In the Startup Profile (Figure 11) the DVR will follow a 1:1 V/Hz profile after generator frequency (engine speed) has increased above the under frequency point (parameter: 10). This profile continues until the frequency reaches the knee frequency (parameter :06). Once the knee frequency has been reached, the generator will be regulated by the DVR to produce full rated voltage, as set by parameter :01. The DVR then switches to the loading and stopping profile.

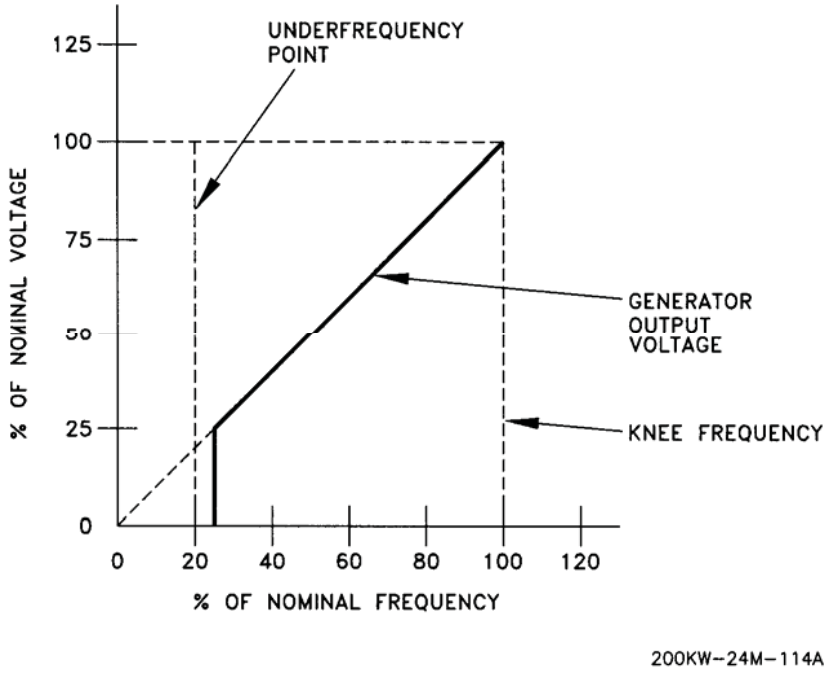

Figure 11. DVR Startup Profile.

DIGITAL VOLTAGE REGULATOR (DVR A3) MODULE - Continued

Loading and Stopping Profile

Loading

The loading and stopping profile (Figure 12) defines how the DVR will react to a reduction in frequency below the knee frequency. A drop in frequency from the generator is usually due to one of two occurrences: either a heavy load was applied which will take the generator a few seconds to recover from, or the engine driving the generator is shutting down. In either case, the DVR reduces the generator output voltage. The reduction in voltage reduces the power requirement of the load, thus allowing the engine to recover faster for a given increase in load.

The rate at which the DVR reduces the output voltage is called Decreasing V/Hz Slope 1 and is set to 3 V/Hz by parameter :07. This rate is effective when the generator frequency is no more than 5 Hz below the knee frequency.

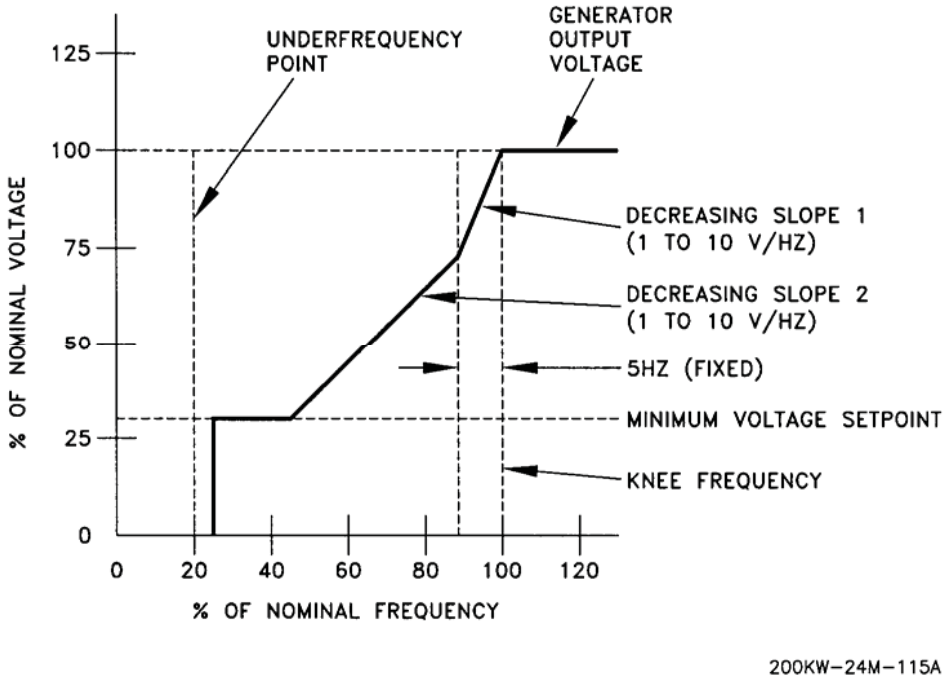

Figure 12. DVR Loading and Stopping Profile.

Stopping

If the frequency drops below 5 Hz below the knee frequency, the generator set is assumed to be shutting down. The DVR will reduce the output voltage further using a parameter called Decreasing V/Hz Slope 2, which is set to 2 V/Hz by parameter :08. This rate is effective until the generator gets to the minimum voltage setpoint (parameter :09). This is the lowest voltage the DVR will attempt to regulate. The voltage will attempt to regulate at this point until the frequency gets to the under frequency point (parameter: 10) at which point the voltage will decrease to a minimum value.

DIGITAL VOLTAGE REGULATOR (DVR A3) MODULE - Continued

Voltage Droop When Connected In Parallel

When generators are operated in parallel, the engine speed regulator (i.e. GSC via LSM A4) controls the sharing of the real power requirements (kW) of the total system load. The DVR controls the sharing of the reactive power requirements (kVAR) of the total system load. If the output voltage of one generator is set slightly higher than the other(s), it will supply lagging reactive current to the other generators in the group. This current will circulate between the generators, possibly causing ampere overloading. One method of minimizing this effect is to cause an individual generator output to sag, or "droop", in proportion to the lagging reactive current flow from it. As reactive lagging generator output current increases, the DVR will cause the output voltage to droop (voltage will decrease) proportionally. If the measured reactive output current is leading, the output voltage will rise (voltage will increase) proportionally. In either case, this action will reduce the reactive current for better KVAR sharing with other units. The droop percentage (parameter :30) determines how much the generator output voltage will vary for a given amount of reactive current.

LOAD SHARING MODULE (LSM A4) INTERNAL OPERATION

The LSM consists of load power monitoring, load comparator, sync dynamics summer, speed trim summer, pulse width modulation (PWM) output, A4K1 relay, circuits and a power supply for internal circuitry.

Load Power Monitoring

The output of current transformers CT-7, CT-8, and CT-9 is input to the load power monitoring circuit. Each current is multiplied by the voltage monitored at pins 1, 2, and 3 of the LSM to generate voltages proportional to the power in each phase of the output. These voltages are summed and input to a variable gain amplifier. The amplifier can be calibrated, using the load gain potentiometer, to compensate for variations in components. The output of the amplifier is input to the load comparator circuit.

Load Comparator Circuit

The Load Signal connection to the load comparator circuit on pins 22 and 23 is used for setup only. The load sharing lines input (pins 10 and 11) to the load contactor circuit are connected to the paralleling connectors J32 and J33 in this generator set. Therefore, this point is connected to all other LSM A4 in other generators. This connection is made through J32, J33, the paralleling relay PAR in the generator set, and A4K1 in this module. Refer to DC circuits (FO-1, sheet 2 and sheet 3) for interconnections external to LSM. By connecting the load sharing lines of this module to those in other generator sets (via the paralleling cables), the load signal voltage is balanced with the other generator sets connected here. The load comparator circuit has a load gain potentiometer to adjust each generator set load signal so that the load signal voltage of each is the same at full load. This compensates for different CT ratios or different generator set sizes. In droop mode (A4K1 not energized), some of the power signal from the variable gain amplifier is subtracted from the main power signal by the differential amplifier in the load comparator circuit. The setting of the Droop potentiometer (only active in Droop) controls the amount in the load comparator circuit. This reduces engine power according to the droop percentage set by this potentiometer.

Sync Dynamics Summer

The sync input (pins 24 and 25) comes from the GSC and is a ±5 Vdc signal developed to control the speed of the engine (and hence the generator). This signal is processed by the sync dynamics circuit and summed with the output of the load comparator circuit.

LOAD SHARING MODULE (LSM A4) INTERNAL OPERATION - Continued

Speed Trim Summer

The speed trim potentiometer is the FREQUENCY potentiometer on the EMCP and permits manual adjustment of the load or frequency of the generator. This signal is summed with the output of the sync dynamics summer and input to the PWM circuit. The potentiometer can trim the frequency of the generator output approximately 10% above and below nominal in unit mode. In parallel mode, the potentiometer can change the load demand if in droop mode also.

Pulse Width Modulation (PWM) Output

The PWM circuit takes the sum of all the inputs and converts the analog voltage level to a PWM signal for driving ECM, setting the engine speed. The frequency is approximately 500 Hz. The duty cycle ranges from 10% for lowest decrease in speed or load, to 90% for maximum increase in speed or load percentage. The duty cycle varies according to the magnitude of difference between the desired load and the actual power generated.

Relay A4K1

Relay A4K1 is energized when the ISOCHRONOUS/DROOP switch is in ISOCHRONOUS and the load contactor is energized. The contacts of A4K1 connect the load sharing input/output to the load comparator circuit. The 24 Vdc input from the batteries is converted to a plus and minus power source (+V and -V) and a plus and minus reference supply (+VR and -VR) for the amplifiers in the module. In a non-paralleled condition, or when the ISOCHRONOUS/DROOP switch is in DROOP, the load comparator circuit is not connected to the load sharing lines. A4K1 is open in Droop mode and the external PAR relay disconnects this output from any other generators in Unit mode. In this configuration, the power measured by the load power monitoring circuits are summed with the sync input from the GSC and the speed trim potentiometer and the PWM output generated from that signal. In a paralleled condition, you must be in isochronous mode in order to connect the load sharing lines to at least one other (possibly more) LSM A4. In this mode, this average load signal of all sets in parallel is then summed with the sync input and the speed trim potentiometer input to generate the PWM signal to the ECM. By doing this, the speed loop is biased to divide the load equally between paralleled generator sets.

In a paralleled condition with Droop enabled, the frequency will vary with load. To minimize this, one generator must be in isochronous mode. This generator set maintains the frequency of the system. On the paralleled generator sets in droop mode, the droop percentage set into the LSM by the droop potentiometer and the speed setting determine the load that is carried by the individual generator.

GENERATOR

The generator (Figure 13) is a brushless, self-excited, externally voltage regulated, synchronous AC generator. The generator consists of five major components: the main stator (armature); main rotor (field); exciter stator (field); exciter rotor (armature); and rectifier assembly. The DVR controls generator output. The generator exciter consists of a stationary field and a rotating armature. The DVR applies voltage to the stationary field (exciter stator). The exciter armature generates an AC voltage that is rectified by the rotating rectifier assembly, converting it to a pulsating DC signal. This DC is applied to the main rotor (field). As the generator shaft rotates, the main rotor (field) induces a voltage into the main stator (armature). The main stator's voltage output is sampled and compared to the programmed desired value in the DVR The exciter field power is increased or decreased in order to regulate the main stator output to the desired value. There are four poles on the generator. There are two + poles and two - poles. During each revolution of the generator, two complete sine waves are produced by the alternating +, -, +, - poles. For 60 Hz operation, the generator shaft will have to turn 60 ÷ 2 revolutions per second (rps) = 30 rps. Engine speed is in rpm, therefore 30 rps x 60 seconds per minute = 1800 rpm engine speed required for 60 Hz operation. 50 Hz operation is the same process (or 50 ÷ 60 x 1800 = 1500 rpm). Note that an excitation is required to get the process started. This excitation, also known as a Field Flash, is described in the DC Power Distribution section. Since there is no permanent magnet structure in the generator assembly, a voltage spike is applied to the exciter field (stator) to ensure that the regulation process gets off to a good start. This generator is built with 2/3 pitch main stator windings and full Amortisseur (damper) windings. These features make the generators suitable for parallel operation when used with the proper voltage and load regulating devices.

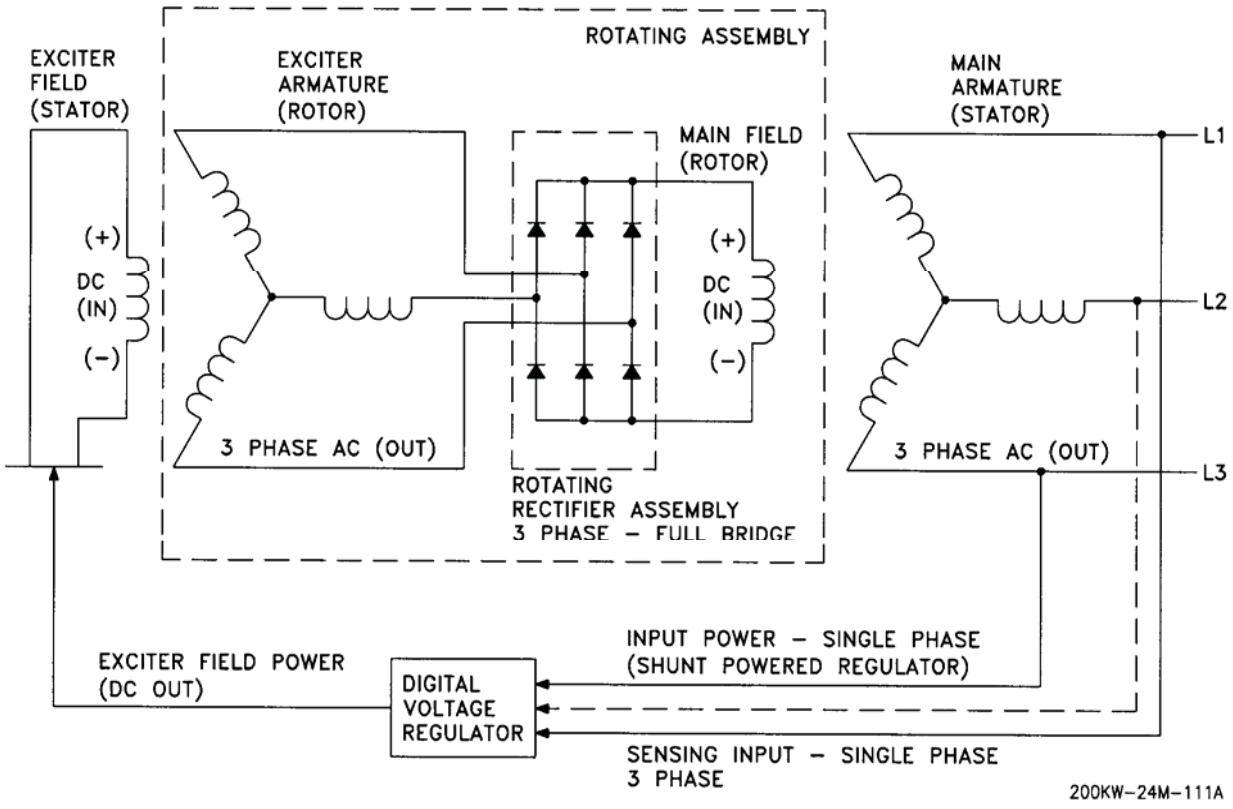

Figure 13. Generator.

WINTERIZATION KIT (FIGURE FO-1, SHEET 6)

There are two components of the winterization kit (Figure 14). One is the LCD display heaters and the other is the fuel fired coolant water heater and pump. The LCD display heater consists of HTR1 and HTR2. These heaters receive power from one of two directions. There is a thermostatic switch (TS) in the control panel that closes when the temperature falls below -20°F ±10°F (-28.9°C ±5.6°C). This switch applies +24 Vdc power to HTR1 and HTR2 in order to keep the liquid crystal displays (LCD) in the GSC and DVR from freezing. Note that this power is only available when the ECS is NOT in OFF. There is also a connection to the winterization control box that will apply power to these resistors any time the winterization system is turned on at the control panel.

The second component of the winterization kit is a fuel fired coolant water heater and pump. The heater burns fuel from the main fuel tank in order to heat the coolant water. The water is then circulated through the engine in order to prevent it from freezing up. When the fuel fired heater is turned on, an internal combustion blower starts, the water pump starts circulating coolant, and the preheating phase of the glow plug is started. After approximately 60 seconds, the heater fuel pump starts to add fuel to the combustion chamber. The fuel/air mixture ignites. The speed of the air fan increases as well as the fuel pump speed through four stages. Low, Med, High, and Power in order to bring the combustion chamber up to operating temperature.

The glow plug protection circuit has a flame detector, which will restart the heater if no flame is detected. If no flame is detected twice, the heater is shut down and power must be cycled OFF and back ON to restart. The heater continues to operate in the Power mode until either the temperature exceeds 162°F (72°C) or 2 hours has elapsed (maximum time allowed in Power mode). The heater then switches between the four modes, as required based on temperature of the coolant (which relates to heat necessary to raise the temperature of the coolant).

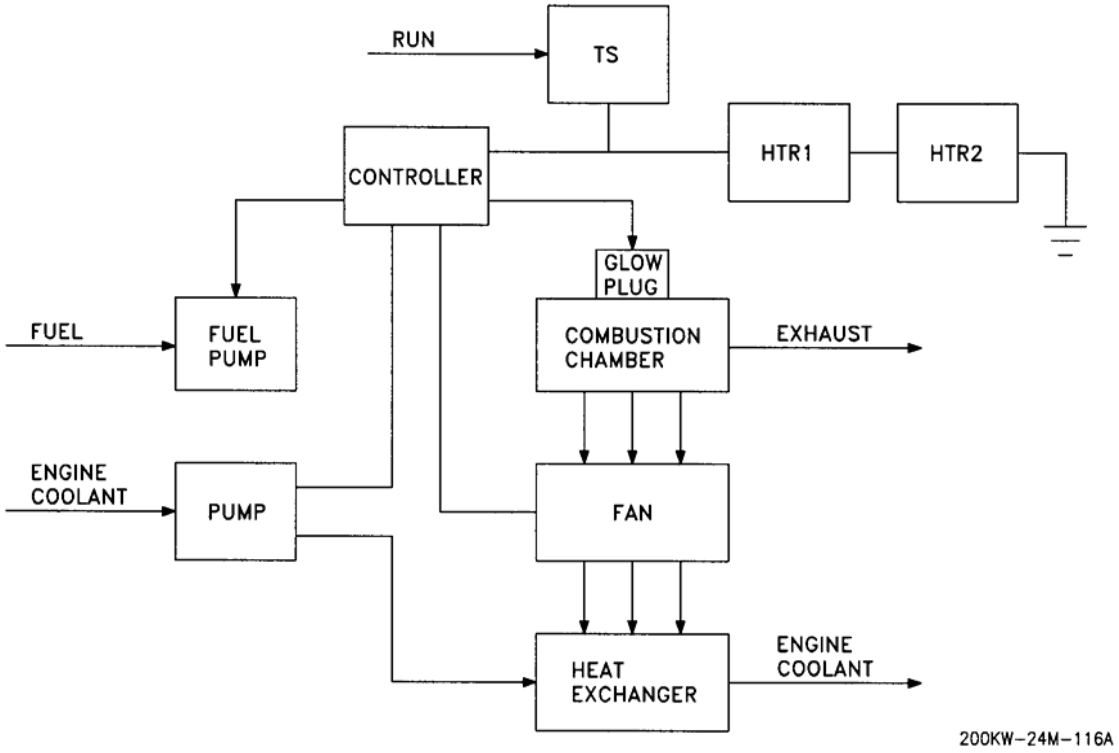

Figure 14. Winterization Kit.

COMMON TOOLS AND TEST EQUIPMENT

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE), Common Table of Allowances (CTA) 50-970, Expendable/Durable Items (Except: Medical, Class V, Repair Parts, and Heraldic Items), or Army Medical Department Expendable/Durable Items CTA 8-100, as applicable to your unit.

SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

Special Tools; Test, Measure, and Diagnostic Equipment (TMDE); and support equipment are needed for unit and direct support maintenance. They are listed in the Repair Parts and Special Tools List (RPSTL), TM 9-6115-730-24P, and in the Maintenance Allocation Chart (MAC) in WP 0123.

REPAIR PARTS

Repair parts are listed in the TM 9-6115-730-24P.

END OF WORK PACKAGE

CHAPTER 2

FIELD LEVEL
TROUBLESHOOTING PROCEDURES

CHAPTER 2

FIELD LEVEL TROUBLESHOOTING PROCEDURES

WORK PACKAGE INDEX

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SP FAULT CODE TROUBLESHOOTING PROCEDURES	0007
AL FAULT CODE TROUBLESHOOTING PROCEDURES	0008
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ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING	0013

FIELD LEVEL TROUBLESHOOTING
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
INTRODUCTION

MALFUNCTION/SYMPTOM INDEX

The Field level troubleshooting Malfunction/Symptom Index (WP 0005) lists common malfunctions found during Field level maintenance of the 200 kW Tactical Quiet Generator (TQG). Identify the malfunction/ symptom that best describes your problem and then turn to the Troubleshooting Procedures (WP 0006 thru WP 0013). Follow each step in sequence through the corrective actions listed in the troubleshooting procedures table until a fault is identified and resolved.

NOTE

Before you use troubleshooting procedures, be sure you have performed PMCS.

TROUBLESHOOTING PROCEDURES

The Troubleshooting Procedures (WP 0006 thru WP 0013) contain procedures that identify symptoms and malfunctions, that are followed by corrective actions required to return the 200 kW TQG system to normal operation. The troubleshooting procedures cannot list all possible symptoms or malfunctions or the tests and inspections required for corrective action. If a malfunction is not listed or is not corrected by the listed corrective actions, notify your supervisor. Before using troubleshooting be sure you have performed PMCS.

The work package INITIAL SETUP outlines what is needed for the task as well as certain conditions which must be met before starting the task. Don't start a task until the following conditions exist:

1. You understand the task.
2. You understand what you are to do.
3. You understand what is needed to do the work.
4. Ensure that you have the correct manual, all related manuals, and test equipment.

The work package troubleshooting procedures have three divisions: SYMPTOM, MALFUNCTION, and CORRECTIVE ACTION. Note that the SYMPTOMs are first listed in the Malfunction/Symptom Index (see WP 0005).

SYMPTOM: Symptoms are the indication that the generator set is not operating properly or at peak performance. The symptom can be an electronically displayed fault code, an alarm or shutdown of the generator set, a visual observation or a sound. Symptoms tell you that there is a problem.

MALFUNCTION: The malfunctions cause the symptom. In the troubleshooting procedures MALFUNCTIONs are presented in order of the most likely cause for the SYMPTOM. MALFUNCTION troubleshooting procedures should be performed in the order in which they appear.

CORRECTIVE ACTIONs are actions intended to correct the problem. The CORRECTIVE ACTION consists of tests and inspections and any steps you take to isolate the malfunction. A test or inspection leads to a corrective action. These are the "if" statements that tell you what to do when the malfunction is not fixed. For Army, corrective action is accomplished by submitting a 5988E to the TAMMS clerk and the clerk processing a job order, with the unit or direct support (Field Level) maintenance team. For Air Force, corrective action is accomplished by submitting an AFR 66-1 maintenance reporting form.

Repairable LRUs shall be turned-in, in accordance with official supply procedures.

TQG TROUBLESHOOTING

The 200 kW TQG set electronics has continuous self-testing capability. Most problems with the generator set will generate a fault code that is displayed on the Generator Set Control (GSC) or the Digital Voltage Regulator (DVR). The troubleshooting procedures for the 200 kW TQG are broken into six separate Work Packages (WP):

WP 0006 GSC Alarm Indicators and Fault Code Troubleshooting Procedures
WP 0007 SP Fault Code Troubleshooting Procedures
WP 0008 AL Fault Code Troubleshooting Procedures
WP 0009 GSC Fault Code Troubleshooting Procedures
WP 0010 DVR Fault Code Troubleshooting Procedures
WP 0011 Failures Without a Fault Code Troubleshooting Procedures
WP 0012 Electronic Technician (ET) Troubleshooting Software Installation
WP 0013 Electronic Technician (ET) Troubleshooting Procedures.

Before trying any fault isolation, make note and record all of the fault codes displayed on the GSC and DVR. Also, note and record any fault lamps that are lit on the GSC and the alarm module.

The failure analysis here usually assumes a single fault code indication. Because of extensive self-testing capability, a single failure will often generate multiple fault codes (e.g. a failure of a power supply will generate a failure code for all of the sensors powered up by that power supply). It may be necessary to read through all of the associated fault isolation procedures prior to starting in order to assess the fault location.

The voltages and currents in the 200 kW TQG are dangerous and capable of causing death instantaneously. The engine and generator set are heavy and represent enormous mechanical power. Refer to the WARNING SUMMARY before attempting to troubleshoot system. The following warnings, cautions, and notes should be read and followed during all attempts at troubleshooting.

WARNING

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

Dangerously high voltage can exist across current transformer (CT) output with engine running. CT could explode if disconnected from load with engine running. Do not disconnect CT with generator rotating. Failure to comply can cause serious injury or death to personnel.

Slave receptacle (NATO connector) is electrically live at all times and is unfused. The Battery Disconnect Switch does not remove power from the slave receptacle. NATO slave receptacle has 24 VDC even when Battery Disconnect Switch is set to OFF. This circuit is only dead when the batteries are fully disconnected. Disconnect batteries before performing maintenance on the slave receptacle. Failure to comply can cause injury or death to personnel.

GSC ALARM INDICATORS AND FAULT CODE TROUBLESHOOTING

For troubleshooting using the fault identification displayed by the GSC you must first note the condition of the various lamps and displayed information on the GSC displays.

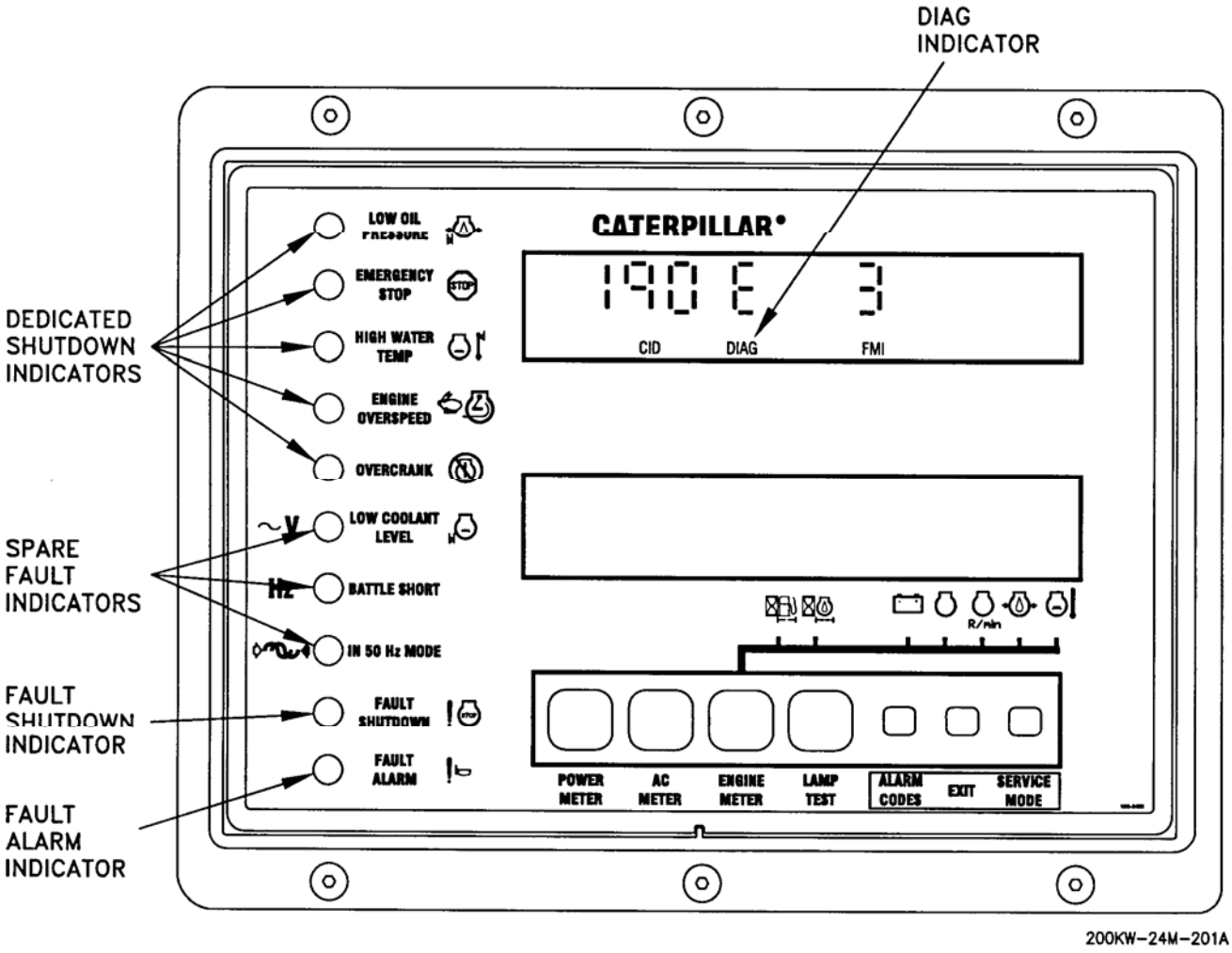

Figure 1. Generator Set Control (GSC) Displays and Dedicated Alarm Indicators.

GSC ALARM INDICATORS AND FAULT CODE TROUBLESHOOTING - Continued

Dedicated Shutdown Indicators	Starts flashing when alarm condition is detected. Lights continuously after shutdown.
Fault Shutdown Indicator	Flashes to indicate system was shut down due to a fault.
Fault Alarm Indicator	Flashes to indicate an alarm condition. Component Identifier (CID) and Failure Mode Identifier (FMI) codes will be displayed on the upper display to identify what is wrong. The CID identifies the component that has a problem, the FMI describes the nature of the failure.
DIAG Indicator	Flashes while there is an active Alarm condition. The diagnostic code should be displayed. Lights continuously when there is an inactive alarm condition or inactive shutdown condition. The diagnostic code is inactive and the CID and FMI were recorded in the Fault Log. If not lit, there are no diagnostic codes available.

There are two basic types of faults: Active and Inactive. An active fault is one that is occurring now, an inactive fault is a fault that has occurred previously.

GSC diagnostic codes are associated with failed components or circuits that provide information to the GSC or that receive information from the GSC. Each diagnostic code consists of the following:

- A component identifier (CID) code
- A failure mode identifier (FMI) code
- The DIAG indicator lit

Two types of faults have diagnostic codes associated with them: alarm faults and shutdown faults. When a fault occurs that has a diagnostic code associated with it, the DIAG indicator flashes, then the GSC flashes either the fault alarm indicator, or the fault shutdown indicator. For a shutdown fault, the CID and FMI are shown on the upper display immediately. For a fault alarm: the ALARM CODES key must be pressed; then the CID and FMI are shown on the upper display. A flashing DIAG indicator means that the fault is presently active. When the DIAG indicator is on continuously, the fault occurred previously.

DIAGNOSTIC EVENTS AND EVENT CODES

The GSC also displays codes for diagnostic events. These event codes are in the same format as the fault codes and they can be active events and may be logged. The Symptom/Malfunction Index and troubleshooting tables show these event codes in sequence with fault codes. Often event codes are related to fault codes and the troubleshooting associated with them. Diagnostic events can be logged in the Engine Control Module (ECM) and used to investigate engine malfunctions. Event codes indicate problems with the engine performance and are symptoms to be investigated. They can also relate directly to required maintenance services or actions.

GSC FAULT CODES

Component Identification (CID) Codes

CID codes are displayed on the GSC Upper Display during and after a fault is detected to identify the component that caused the fault. These codes are stored in the GSC fault log. If an E is shown after the CID, the diagnostic code is from the Engine Control Module (ECM).

Fault Mode Identification (FMI) Codes

FMI codes are used with the CID codes to describe the type of failure detected. FMI codes are in accordance with SAE practice of J1587 diagnostics. These codes are stored in the GSC fault log.

FMI Code	Description
0	Data is valid but data is above normal operating range
1	Data is valid but data is below normal operating range
2	Erratic, intermittent, or incorrect signal
3	Voltage above normal
4	Voltage below normal
5	Current is below normal or circuit is open
6	Current is above normal or circuit is grounded
7	Improper Mechanical Response
8	Abnormal frequency, pulse width, or period
9	Abnormal Update
10	Abnormal rate of change
11	Failure mode is not identifiable (Mechanical Failure)
12	Failed Component
13	Device is not calibrated

FAULT LOG

The GSC has a fault log to help with troubleshooting of diagnostic codes. Inactive fault codes are recorded in the fault log for viewing later. Also, the number of occurrences is totaled and is shown on the upper display together with the CID and FMI codes. An active alarm fault becomes inactive when the problem is no longer occurring. The ENGINE CONTROL switch must be set to OFF/RESET to reset a shutdown fault.

VIEWING FAULT LOG OP1

STEP 1. To view the fault log, set ENGINE CONTROL switch to COOL DOWN/STOP.

NOTE

In SERVICE MODE, the buttons on the GSC keypad perform new functions as follows:

POWER METER	is Scroll Right
AC METER	is Scroll Up
ENGINE METER	is Scroll Down
LAMP TEST	is Select
ALARM CODES	is Enter

STEP 2. Press SERVICE MODE key on GSC keypad. SERV will be displayed on upper display. OP1 will be displayed on lower display.

STEP 3. Press LAMP TEST key on keypad. If more than one diagnostic code is present, codes will scroll on display. The number of occurrences is shown above the COUNT indicator. The lower display shows value from the hour meter at the first occurrence and the last occurrence of each diagnostic code.

STEP 4. Press LAMP TEST key to stop scrolling.

STEP 5. Press POWER METER key. If more than one count of a diagnostic code is logged, the first occurrence with a corresponding value from the hour meter shows on the lower display.

STEP 6. Press LAMP TEST key. Diagnostic codes continue scrolling.

STEP 7. Press EXIT key. OP1 shows on lower display.

STEP 8. Press EXIT to return display to normal mode.

FAULT LOG CLEARING OP4

OP4 is the option for clearing an inactive fault from the fault log. After a diagnostic fault is investigated and the fault is corrected, the fault should be cleared from the fault log. Clearing the fault log prevents confusion if you are investigating later faults.

NOTE

Service mode cannot be entered when the ENGINE CONTROL switch is set to AUTO. An active shutdown indictor will be flashing. Active shutdown indicators must be deactivated in order to access service mode.

STEP 1. Set Battery Disconnect Switch to ON.

STEP 2. Set DEAD CRANK SWITCH to NORMAL.

STEP 3. On EMCP, set ENGINE CONTROL switch to COOL DOWN/STOP.

FAULT LOG CLEARING OP4 - Continued

NOTE

In SERVICE MODE, the buttons on the GSC keypad perform new functions as follows:

POWER METER	is Scroll Right
AC METER	is Scroll Up
ENGINE METER	is Scroll Down
LAMP TEST	is Select
ALARM CODES	is Enter

STEP 4. Press SERVICE MODE key on GSC. SERV will be displayed on upper display. OP1 will be displayed on lower display.

STEP 5. Press AC METER key five times. OP3 will be displayed.

STEP 6. Press the LAMP TEST key. P E _ _ _ _ _ _will be displayed. The left-most underline will be flashing. If an error is made any time during the password entry, P E FAIL will be displayed. Password entry can be restarted by pressing LAMP TEST key.

STEP 7. Press POWER METER key. P E 1 _ _ _ _ will be displayed. The left-most underline will be flashing.

STEP 8. Press ENGINE METER key. P E 1 3 _ _ _ will be displayed. The left-most underline will be flashing.

STEP 9. Press AC METER key. P E 1 3 2 _ _ will be displayed. The left-most underline will be flashing.

STEP 10. Press ENGINE METER key. P E 1 3 2 3 _ will be displayed. The underline will be flashing.

STEP 11. Press POWER METER key. P E 1 3 2 3 1 will be displayed.

STEP 12. Press ALARM CODES key. P E PASS will be displayed.

STEP 13. Press EXIT key. OP4 will be displayed.

STEP 14. Press LAMP TEST. A CID FMI fault code and the number of occurrences will be displayed. Lower display shows hourmeter values of the first occurrence of the fault and the last occurrence of the fault.

STEP 15. Press LAMP TEST. The CID FMI fault code, hourmeter value, and fault count will flash.

STEP 16. Press and hold ALARM CODES for two seconds.

STEP 17. If there was only one CID FMI fault code, the CID FMI fault that was flashing will disappear and the upper display will be blank except for flashing SERV indicator. OP1 is shown on lower display. Proceed to step 20.

STEP 18. If there is more than one CID FMI fault code, the CID FMI that was flashing disappears. The upper display shows the next CID FMI fault code, fault count, and the hourmeter value. Repeat steps 15 thru 17 until all faults are erased. The lower display then shows OP4. Proceed to step 20.

STEP 19. Press EXIT key. OP4 will show on lower display.

STEP 20. Press EXIT key. The display will be in normal mode.

TRANSIENT CODES DURING TROUBLESHOOTING

During troubleshooting, certain work packages may disconnect the harness from the rear of the GSC. This action will cause failure codes unrelated to the actual failure to appear. Clear these created diagnostic codes after the particular fault is corrected and the diagnostic code is cleared. When the harness connector is removed from the GSC, the following diagnostic codes are recorded in a properly operating system.

CID 100 FMI 02 Engine Oil Pressure Sensor
CID 110 FMI 02 Engine Coolant Temperature Sensor
CID 111 FMI 03 Engine Coolant Level Sensor
CID 175 FMI 03 Engine Oil Temperature Sensor
CID 190 FMI 03 Engine Speed Sensor
CID 336 FMI 02 Engine Control Switch

Clear diagnostic codes after the problem is investigated or the problem is corrected. This will avoid confusion during investigation of a future problem. The DIAG indicator is off when all diagnostic codes are cleared from the fault log and no active diagnostic codes exist.

DVR FAULT CODE TROUBLESHOOTING

The DVR will annunciate four types of faults. These are described in detail below.

FAULT CLASSIFICATION	DESCRIPTION
Alarm Fault	Alarm Faults indicate a condition that will not inhibit the function of the DVR and the generator set. Alarm Fault codes are in the 600's range. The generator set will continue to operate at a normal level.
Resetable Shutdown fault	Resetable Shutdown Faults indicate a condition where either DVR or generator set exhibits a degradation of performance. Resetable Shutdown Fault codes are in the 700's range. The generator set continues to operate, but at a reduced level too low to sustain load. Resetting the fault returns the DVR to normal operation. The fault code remains in parameter :92.
Non-resetable Shutdown fault	Non-resetable Shutdown faults indicate a condition where the DVR cannot be safely run. Non-resetable Shutdown Fault codes are in the 800's range. The generator set continues to operate, but at a reduced level too low to sustain load. Setting the ENGINE CONTROL switch to OFF/RESET is required to reset the fault.
Severe fault	Severe faults may indicate the failure of the DVR. Severe faults occur at power-up or when writing a new value to memory. Severe faults cause the DVR to prohibit power generation. The keypad will be disabled. Severe faults cannot be reset. The DVR will have to be replaced. Severe Fault codes are in the 900's range.

DVR FAULT CODE TROUBLESHOOTING - Continued

Fault codes are stored in Parameters. The following DVR parameters are associated with fault isolation:

Parameter :92 - **Latest fault.** Contains the code for the most recently declared, or current, fault that has occurred after the last fault was reset. It may contain either alarm or shutdown faults.

Parameter :93 - **Previous fault.** Contains the fault code for the previous fault (both alarm and shutdown faults) that were in parameter :92. This parameter may contain an active alarm if an active alarm was present in parameter :92 and a shutdown fault occurred. The alarm code that was in parameter :92 would be moved here and any code that was here is overwritten. When the code in parameter :92 is cleared using the fault clear function (parameter :94), the code is moved here.

Parameter :94 - **Fault Clear.** This parameter acts like a switch to clear fault codes from latest fault parameter :92. The code that was in parameter :92 is moved to parameter :93 (previous fault) overwriting the code that was there and parameter :92 is returned to 0000.

Parameter :96 - **Shutdown Fault Reset.** Acts like a switch to reset an active shutdown fault. This will allow the DVR to begin regulation again and stop the display from flashing the fault code.

When a fault condition occurs, the fault code will flash on the DVR display. Alarm faults must be cleared using parameter :94 before another alarm fault can be declared. A shutdown fault will override an alarm fault, placing its code in the latest fault parameter (:92), and will move the alarm fault code to the previous fault parameter (:93). Parameter codes are retained during power down of the DVR.

To clear a fault, press and hold up arrow key ▲ or down key ▼ to select parameter :94 on the display and press the function key ◀▶. Each time the fault clear function is activated, the display will flash three times, the code that was in parameter :92 (latest fault) is moved to parameter :93 (previous fault) overwriting the code that was there and parameter :92 is returned to 0000. The display will return to parameter :01.

To reset a shutdown fault, press and hold up arrow key ▲ or down key ▼ to select parameter :96 on the display and press the function key ◀▶. Each time the fault clear function is activated, the display will flash three times, the DVR will begin regulation again, the display will stop flashing, and the display will return to parameter :01.

TROUBLESHOOTING FAILURES WITHOUT A FAULT CODE

For troubleshooting failures without a fault code refer to the Malfunction/Symptom Index in WP 0005.

TROUBLESHOOTING USING MAINTENANCE SUPPORT DEVICE (MSD) AND ELECTRONIC TECHNICIAN (ET) TOOL

The Field level troubleshooting Malfunction/Symptom Index (WP 0005) lists symptoms and malfunctions for troubleshooting diagnostics to be performed for Field maintenance of the 200 kW Tactical Quiet Generator (TQG). Identify the malfunction/symptom and diagnostic procedure that best describes your problem and then if directed, turn to WP 0012 to set up the Electronic Technician (ET) tool and install necessary software. The ET tool allows you to perform engine specific tests for additional diagnostics contained in WP 0013. Follow each step in sequence through the diagnostic tests or inspections listed in the troubleshooting procedures table until a fault is identified and corrected.

END OF WORK PACKAGE

FIELD LEVEL TROUBLESHOOTING
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
TROUBLESHOOTING INDEX

Malfunction/Symptom **Troubleshooting Procedure**

GSC ALARM INDICATORS AND FAULT CODE

1. LOW OIL PRESSURE light ..... WP 0006
2. EMERGENCY STOP light ..... WP 0006
3 HIGH WATER TEMP light ..... WP 0006
4. ENGINE OVERSPEED light ..... WP 0006
5. OVERCRANK light ..... WP 0006
6. FAULT SHUTDOWN light flashing red for shut down ..... WP 0006
7. FAULT ALARM light flashing yellow ..... WP 0006
8. No indicator lit DIAG not on Fault codes displayed ..... WP 0006
9. No indicator lit DIAG not on No fault codes displayed ..... WP 0006

SP FAULT CODE

1. SP 1 Low Fuel Level ..... WP 0007
2. SP 2 (DVR Fault) ..... WP 0007
3. SP 3 Bus Frequency Fault (Paralleling Only) ..... WP 0007
4. SP 4 Bus Voltage Fault (Paralleling Only) ..... WP 0007

AL FAULT CODE

1. AL 1 High Coolant Temperature ..... WP 0008
2. AL 2 Low Coolant Temperature ..... WP 0008
3. AL 3 Low Engine Oil Pressure ..... WP 0008
4. AL 4 Fault Detected by Engine ECM ..... WP 0008
5. AL 5 Low Engine Coolant Level ..... WP 0008
6. AL 7 Generator Over Voltage ..... WP 0008
7. AL 8 Generator Under Voltage ..... WP 0008
8. AL 9 Generator Over Frequency ..... WP 0008
9. AL 10 Generator Under Frequency ..... WP 0008
10. AL 11 Generator Reverse Power ..... WP 0008
11. AL 12 Phase Over Current ..... WP 0008
12. AL 13 Generator Total Over Current ..... WP 0008
13. AL 14 Phase A No Voltage Input at GSC input (P7-10) ..... WP 0008
14. AL 15 GSC Configuration Error ..... WP 0008
15. AL 16 Incorrect Phase Sequence - Paralleling fault code ..... WP 0008
16. AL 17 Improper Generator or Bus Voltage - Paralleling fault code ..... WP 0008
17. AL 18 Synchronizer Time-out - Paralleling fault code ..... WP 0008

Malfunction/Symptom **Troubleshooting Procedure**

GSC FAULT CODE

1. CID 1 E FMI 11 Cylinder 1 Failure mode is not identifiable (Mechanical Failure) (Logged) ..... WP 0009
2. CID 2 E FMI 11 Cylinder 2 Failure mode is not identifiable (Mechanical Failure) (Logged) ..... WP 0009
3. CID 3 E FMI 11 Cylinder 3 Failure mode is not identifiable (Mechanical Failure) (Logged) ..... WP 0009
4. CID 4 E FMI 11 Cylinder 4 Failure mode is not identifiable (Mechanical Failure) (Logged) ..... WP 0009
5. CID 5 E FMI 11 Cylinder 5 Failure mode is not identifiable (Mechanical Failure) (Logged) ..... WP 0009
6. CID 6 E FMI 11 Cylinder 6 Failure mode is not identifiable (Mechanical Failure) (Logged) ..... WP 0009
7. CID 9 E FMI 02 High Altitude Derate (Active) Erratic, Intermittent, or Incorrect Signal ..... WP 0009
8. CID 41 FMI 02 8 Volt Power Supply not Normal Erratic, Intermittent, or Incorrect Signal (Logged)..... WP 0009
   CID 41 FMI 03 8 Volt Power Supply Above Normal Voltage Above Normal (Logged) ..... WP 0009
   CID 41 FMI 04 8 Volt Power Supply Below Normal Voltage Above Normal (Logged)..... WP 0009
9. CID 85 E FMI 01 Shutdown Overridden Data is Valid but Data is Below Normal Operating Range (Logged) ..... WP 0009
10. CID 91 FMI 08 Throttle Position Sensor Abnormal Frequency, Pulse Width, or Period (Not Logged) ..... WP 0009
11. CID 94 FMI 01 Fuel Pressure Sensor Data is Valid but Data is Below Normal Operating Range (Logged) ..... WP 0009
    CID 94 FMI 02 Fuel Pressure Sensor Erratic, Intermittent, or Incorrect Signal..... WP 0009
12. CID 94 E FMI 03 Fuel Pressure Sensor Voltage Above Normal (Logged) ..... WP 0009
    CID 94 E FMI 04 Fuel Pressure Sensor Voltage Below Normal ..... WP 0009
13. CID 96 E FMI 01 High Fuel Pressure Warning Data is Valid but Data is Below Normal Operating Range (Active and Logged) ..... WP 0009
14. CID 97 E FMI 01 Derate Overridden Data is Valid but Data is Below Normal Operating Range (Logged)..... WP 0009
15. CID 100 E FMI 02 Oil Pressure Sensor Erratic, Intermittent, or Incorrect Signal (Logged) ..... WP 0009
16. CID 100 E FMI 03 Oil Pressure Sensor Voltage Above Normal (Logged)..... WP 0009
    CID 100 E FMI 04 Oil Pressure Sensor Voltage Below Normal..... WP 0009
17. CID 110 E FMI 02 Engine Coolant Temperature Sensor Erratic, Intermittent, or Incorrect Signal (Logged)..... WP 0009
    CID 110 FMI 03 Engine Coolant Temperature Sensor Voltage Above Normal (Logged)..... WP 0009
    CID 110 E FMI 04 Engine Coolant Temperature Sensor Voltage Below Normal (Logged)..... WP 0009
18. CID 111 E FMI 03 Low Coolant Sensor Voltage Above Normal ..... WP 0009
19. CID 168 E FMI 02 Electrical System Voltage Erratic, Intermittent, or Incorrect Signal..... WP 0009
    CID 168 E FMI 03 Electrical System Voltage Above Normal ..... WP 0009
    CID 168 E FMI 04 Electrical System Voltage Below Normal..... WP 0009
20. CID 169 E FMI 01 Engine Oil Maintenance Required (Active)..... WP 0009
21. CID 170 E FMI 01 Fuel Filter Change Required (Active) ..... WP 0009
22. CID 172 E FMI 00 Intake Manifold Air Temperature Sensor Data is Valid but Data is Above Normal Operating Range (Logged) ..... WP 0009
    CID 172 E FMI 03 Intake Manifold Air Temperature Sensor Voltage Below Normal Voltage Open/ Short to Batt+. ..... WP 0009
    CID 172 E FMI 04 Intake Manifold Air Temperature Sensor Voltage Below Normal Voltage Short to Ground..... WP 0009
    CID 172 E FMI 11 Intake Manifold Air Temperature Sensor Failure Mode is Not Identifiable (Mechanical Failure) (Logged)..... WP 0009

Malfunction/Symptom **Troubleshooting Procedure**

GSC FAULT CODE - Continued

23. CID 174 FMI 03 Fuel Temperature Sensor Voltage Above Normal ..... WP 0009
24. CID 190 FMI 02 Loss of Engine Speed Signal, Erratic, Intermittent, or Incorrect Signal ..... WP 0009
CID 190 FMI 03 Magnetic Pickup Unit (Engine Speed Sensor) Voltage Above Normal ..... WP 0009
25. CID 190 E FMI 02 Loss of Engine Timing Signal, Erratic, Intermittent, or Incorrect Signal ..... WP 0009
CID 190 E FMI 11 Crankshaft (Bottom) Engine Timing Sensor Failure Mode is Not Identifiable (Mechanical Failure) ..... WP 0009
26. CID 248 FMI 09 CAT Data Link Abnormal update ..... WP 0009
27. CID 253 E FMI 02 Personality Module Mismatch Erratic, Intermittent, or Incorrect Signal ..... WP 0009
28. CID 254 E FMI 12 ECM Self Test Failed Component ..... WP 0009
29. CID 261 E FMI 13 Engine Timing Calibration Device is Not Calibrated ..... WP 0009
30. CID 262 E FMI 03 5 V Sensor Power Supply Voltage Above Normal ..... WP 0009
CID 262 E FMI 04 5 V Sensor Power Supply Voltage Below Normal ..... WP 0009
31. CID 264 E FMI 03 E-Stop Shutdown Voltage Above Normal (Active) ..... WP 0009
32. CID 268 FMI 02 GSC Electronic Control Erratic, Intermittent, or Incorrect Signal ..... WP 0009
33. CID 269 FMI 03 GSC 8V Sensor Power Supply Voltage Above Normal ..... WP 0009
CID 269 FMI 04 GSC 8V Sensor Power Supply Voltage Below Normal ..... WP 0009
34. CID 273 FMI 03 Turbo Outlet Pressure Sensor Voltage Above Normal ..... WP 0009
CID 273 FMI 04 Turbo Outlet Pressure Sensor Voltage Below Normal ..... WP 0009
35. CID 274 FMI 02 Atmospheric Pressure Sensor Erratic, Intermittent, or Incorrect Signal ..... WP 0009
36. CID 274 FMI 03 Atmospheric Pressure Sensor Voltage Above Normal ..... WP 0009
CID 274 FMI 04 Atmospheric Pressure Sensor Voltage Below Normal ..... WP 0009
37. CID 334 FMI 02 Spare Output (P7-36) Erratic, Intermittent, or Incorrect Signal ..... WP 0009
CID 334 FMI 03 Spare Output (P7-36) Voltage Above Normal ..... WP 0009
CID 334 FMI 04 Spare Output (P7-36) Voltage Below Normal ..... WP 0009
38. CID 336 E FMI 02 ENGINE CONTROL Switch (ECS) Erratic, Intermittent, or Incorrect Signal ..... WP 0009
39. CID 342 E FMI 02 Camshaft (Top) Engine Speed/Timing Sensor Erratic, Intermittent, or Incorrect Signal (Logged) ..... WP 0009
CID 342 E FMI 11 Camshaft (Top) Engine Speed/Timing Sensor Failure mode is not identifiable (Mechanical Failure) (Logged) ..... WP 0009
40. CID 360 E FMI 01 Low Engine Oil Pressure Warning (Active & Logged) Data is Valid But Data is Below Normal Operating Range ..... WP 0009
CID 360 E FMI 02 Low Engine Oil Pressure Derate (Active & Logged) Erratic, Intermittent, or Incorrect Signal ..... WP 0009
CID 360 E FMI 03 Low Engine Oil Pressure Shutdown (Active & Logged) Voltage Above Normal ..... WP 0009
41. CID 361 E FMI 01 High Engine Coolant Temperature Warning (Active & Logged) Data is Valid But Data is Below Normal Operating Range ..... WP 0009
CID 361 E FMI 02 High Engine Coolant Temperature Derate (Active and Logged) Erratic, Intermittent, or Incorrect Signal ..... WP 0009
CID 361 E FMI 03 High Engine Coolant Temperature Shutdown (Active & Logged) Voltage Above Normal ..... WP 0009

Malfunction/Symptom **Troubleshooting Procedure**

GSC FAULT CODE - Continued

42. CID 362 E FMI 01 Overspeed Warning (Active and Logged) Data is Valid But Data is Below Normal Operating Range ..... WP 0009
CID 362 E FMI 03 Overspeed Shutdown (Active & Logged) Voltage Above Normal ..... WP 0009
43. CID 368 E FMI 01 High Inlet Air Temperature Warning (Active and Logged) Data is Valid But Data is Below Normal Operating Range ..... WP 0009
44. CID 390 E FMI 01 Fuel Filter Restriction Warning (Active and Logged) Data is Valid But Data is Below Normal Operating Range ..... WP 0009
45. CID 391 E FMI 01 Inlet Air Restriction Warning (Active and Logged) Data is Valid But Data is Below Normal Operating Range ..... WP 0009
46. CID 441 FMI 12 GSC Engine Governor Relay (EGR) Output Failed Component ..... WP 0009
47. CID 442 FMI 12 GSC Generator Fault Relay (GFR) Output Failed Component ..... WP 0002
48. CID 443 FMI 12 GSC Crank Termination Relay (CTR) Output Failed Component ..... WP 0009
49. CID 444 FMI 12 GSC Starter Motor Relay (SMR) Output Failed Component ..... WP 0009
50. CID 445 FMI 12 GSC Run Relay (RR) Output Failed Component ..... WP 0009
51. CID 447 FMI 12 GSC Fuel Control Relay (FCR) Output Failed Component ..... WP 0009
52. CID 448 FMI 12 GSC Programmable Spare Relay (PSR) Output Failed Component ..... WP 0009
53. CID 500 FMI 12 GSC Failed Component ..... WP 0009
54. CID 545 FMI 05 Ether Control Relay Current is Below Normal or Circuit is Open ..... WP 0009
CID 545 FMI 06 Ether Control Relay Current is Above Normal or Circuit is Grounded ..... WP 0009
55. CID 566 FMI 07 Unexpected Shutdown Improper Mechanical Response ..... WP 0009
56. CID 590 FMI 09 Engine Electronic Control Module Abnormal Update ..... WP 0009
57. CID 770 FMI 09 Customer Communication Module (CCM) Data Link Abnormal Update ..... WP 0009
58. CID 858 FMI 02 Close Breaker Output Erratic, Intermittent, or Incorrect Signal ..... WP 0009
CID 858 FMI 03 Close Breaker Output Voltage Above Normal ..... WP 0009
CID 858 FMI 04 Close Breaker Output Voltage Below Normal ..... WP 0009
59. CID 1038 FMI 02 Speed Adjust 1 Output P7-27 (+) and P7-28 (-) Erratic, Intermittent, or Incorrect Signal ..... WP 0009
CID 1038 FMI 03 Speed Adjust 1 Output P7-27 (+) and P7-28 (-) Voltage Above Normal ..... WP 0009
CID 1038 FMI 04 Speed Adjust 1 Output P7-27 (+) and P7-28 (-) Voltage Below Normal ..... WP 0009
60. CID 1167 FMI 04 K1 Sense Input (P7-25) Voltage Below Normal ..... WP 0009
61. CID 1168 FMI 03 Dead Bus Sense Input (P7-29) Voltage Above Normal ..... WP 0009
62. CID 1169 FMI 02 AC Transformer Box (ATB) Sensor Erratic, Intermittent, or Incorrect Signal ..... WP 0009
63. CID 1170 FMI 02 Bus Transformer Box (BTB) Sensor Erratic, Intermittent, or Incorrect Signal ..... WP 0009
CID 1170 FMI 04 Bus Transformer Box (BTB) Sensor Voltage Below Normal ..... WP 0009
CID 1170 FMI 08 Bus Transformer Box (BTB) Sensor Abnormal frequency, pulse width, or period ..... WP 0009
64. CID 1589 E FMI 02 Turbo Air Inlet Pressure Sensor Erratic, Intermittent, or Incorrect Signal ..... WP 0009
65. CID 1589 E FMI 03 Turbo Air Inlet Pressure Sensor Voltage Above Normal ..... WP 0009
CID 1589 E FMI 04 Turbo Air Inlet Pressure Sensor Voltage Below Normal ..... WP 0009

Malfunction/Symptom **Troubleshooting Procedure**

DVR FAULT CODE

1. 0000 No Fault Present ..... WP 0010
2. 601 Internal Memory Failure ..... WP 0010
3. 602 Internal Watchdog Failure ..... WP 0010
4. 603 Rotating Diode Malfunction ..... WP 0010
5. 604 Reverse VAR ..... WP 0010
6. 701 Undervoltage ..... WP 0010
7. 702 Overvoltage ..... WP 0010
8. 703 Overexcitation ..... WP 0010
9. 704 Reverse VAR ..... WP 0010
10. 801 Instantaneous Trip ..... WP 0010
11. 802 Loss of Sensing ..... WP 0010
12. 803 Loss of Frequency ..... WP 0010
13. 901 DVR Memory Failure ..... WP 0010

FAILURES WITHOUT A FAULT CODE

1. Starting Motor Remains Engaged ..... WP 0011
2. Engine Does Not Shut Down When A Shutdown Fault Occurs or Engine Shuts Down with No GSC Fault Codes ..... WP 0011
3. GSC Operation Is Erratic ..... WP 0011
4. Display Of Voltage on GSC is Zero For One or More Phases ..... WP 0011
5. Display of Current on GSC is Zero For One or More Phases ..... WP 0011
6. Display of Voltage on GSC is Inaccurate ..... WP 0011
7. Display of Current on GSC is Inaccurate ..... WP 0011
8. Display of Power on GSC is Inaccurate ..... WP 0011
9. Generator Produces No Voltage ..... WP 0011
10. Generator Produces Low Voltage Under No Load Condition ..... WP 0011
11. Generator Produces Low Voltage When Load is Applied ..... WP 0011
12. Generator Produces Fluctuating Voltage ..... WP 0011
13. Generator Produces High Voltage ..... WP 0011
14. Generator is Overheating ..... WP 0011
15. Equipment Runs Normally on Other Source Of Power (Utility or Other Generator Set), But Will Not Run on This Generator Set ..... WP 0011
16. Undesirable Speed Decrease With Load Increase ..... WP 0011
17. Load Sharing Module A4 Erratic Operation ..... WP 0011
18. Engine Not Properly Sharing Load With Other Generator Sets (Parallel Operation) ..... WP 0011
19. Engine Will Not Crank (Starter Pinion Engages and Engine Does Not Turn Over) ..... WP 0011
20. Engine Cranks But Will Not Start ..... WP 0011
21. Engine Misfires, Runs Rough, or is Unstable ..... WP 0011
22. Low Power/Poor or No Response to Throttle ..... WP 0011
23. Intermittent Engine Shut Downs ..... WP 0011
24. Excessive Black Smoke ..... WP 0011
25. Excessive White Smoke ..... WP 0011
26. Can Not Reach Operating Engine RPM ..... WP 0011
27. Poor Acceleration or Response ..... WP 0011
28. Poor Fuel Consumption ..... WP 0011
29. Engine Stalls at Low RPM ..... WP 0011
30. Auxiliary Fuel Pump Does Not Operate ..... WP 0011

Malfunction/Symptom **Troubleshooting Procedure**

FAILURES WITHOUT A FAULT CODE - Continued

31. Engine Runs Out of Fuel With No LOW FUEL LEVEL Alarm ..... WP 0011
32. Alternator Does Not Charge Batteries ..... WP 0011
33. Coolant in Engine Oil ..... WP 0011
34. Coolant Temperature Too High ..... WP 0011
35. ECM Will Not Communicate With Other Systems or Display Modules ..... WP 0011
36. Engine Oil in Coolant ..... WP 0011
37. Engine Oil in Exhaust System ..... WP 0011
38. Engine Oil Temperature Too High ..... WP 0011
39. Engine Vibration ..... WP 0011
40. Excessive Engine Oil Consumption ..... WP 0011
41. Excessive Valve Lash ..... WP 0011
42. Exhaust Temperature is Too High ..... WP 0011
43. Fuel in Engine Oil ..... WP 0011
44. Intermittent Low Power or Power Cutout ..... WP 0011
45. Low Engine Oil Pressure ..... WP 0011
46. Mechanical Noise (Knock) in Engine ..... WP 0011
47. Noise Coming From Cylinder ..... WP 0011

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING

1. Electrical Connectors Wiggle Test ..... WP 0013
2 Electrical Power Supply Circuit Test ..... WP 0013
3. Engine Timing Sensor Circuit Test ..... WP 0013
4. Ether Injection System Test ..... WP 0013
5. Injector Solenoid Circuit Test ..... WP 0013
6. Speed Control Test ..... WP 0013
7. Electronic Service Tool (Cat ET) will not communicate with ECM ..... WP 0013
8. Engine Timing Sensor Calibrate ..... WP 0013
9. Flash Programming ..... WP 0013
10. Engine Fuel Pressure Reading ..... WP 0013
11. Engine Status ..... WP 0013
12. Load Injector Code ..... WP 0013
13. Copy Configuration/ECM Replacement ..... WP 0013

END OF WORK PACKAGE

FIELD LEVEL TROUBLESHOOTING

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

GSC ALARM INDICATORS AND FAULT CODE TROUBLESHOOTING PROCEDURES

INITIAL SETUP:

Personnel Required	References
One	TM 9-6115-730-10

TROUBLESHOOTING USING DEDICATED SHUTDOWN INDICATORS

The dedicated shutdown indicators identify the system that is responsible for an engine shutdown. The Generator Set Control (GSC) activates the appropriate dedicated shut down fault lamp when the particular fault condition is sensed. The lamp will flash until the GSC shuts the engine down, then the lamp will light continuously. Dedicated shutdowns are not recorded in the GSC fault log.

The GSC dedicated shutdown indicators and their sensors are described in WP 0009.

WARNING

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/or liquids can result in burns and scalding. Shut down generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply can cause injury or death to personnel.

CAUTION

The dipstick is marked so that the crankcase oil can be checked while engine is stopped or running. Always make sure dipstick is checked. Remove oil filler cap when checking oil with engine running.

SYMPTOM

1. LOW OIL PRESSURE light

MALFUNCTION

LOW OIL PRESSURE detected by engine. The signal is routed through Engine Control Module (ECM) to GSC.

CORRECTIVE ACTION

STEP 1. Check oil level and perform service per TM 9-6115-730-10.

STEP 2. If fault codes displayed on upper display, troubleshoot per WP 0009.

TROUBLESHOOTING USING DEDICATED SHUTDOWN INDICATORS - Continued

SYMPTOM

2. EMERGENCY STOP light

MALFUNCTION

Detected when PUSH TO STOP EMERGENCY STOP pushbutton on Electronic Modular Control Panel (EMCP) is pressed. Pressing EMERGENCY STOP disables the control input to the ECM, stopping the engine immediately. EMERGENCY STOP disables the starter circuit so that the GSC can not restart the engine (DEAD CRANK SWITCH can still crank the engine). An input from the EMERGENCY STOP notifies the GSC that the button is pressed.

CORRECTIVE ACTION

STEP 1. Correct emergency situation that caused operator to press EMERGENCY STOP.

STEP 2. If fault codes present on upper display, troubleshoot per WP 0009.

STEP 3. When Tactical Quiet Generator (TQG) is returned to service, continue operations.

SYMPTOM

3. HIGH WATER TEMP light

MALFUNCTION

HIGH WATER TEMP is detected by engine sensor. The signal is routed through ECM to GSC.

CORRECTIVE ACTION

STEP 1. Check coolant level and perform service per TM 9-6115-730-10.

STEP 2. If fault codes displayed on upper display, troubleshoot per WP 0009.

SYMPTOM

4. ENGINE OVERSPEED light

MALFUNCTION

Engine RPM is monitored directly by the GSC using a magnetic pickup unit (MPU) on the engine flywheel. ENGINE OVERSPEED RPM is set by OP5-0, P010.

CORRECTIVE ACTION

STEP 1. If fault codes displayed on upper display, troubleshoot per WP 0009.

STEP 2. If necessary, verify OP5-0, P010 setpoint EMCP programming (WP 0083 Table 4).

TROUBLESHOOTING USING DEDICATED SHUTDOWN INDICATORS - Continued

SYMPTOM

5. OVERCRANK light

MALFUNCTION

If engine does not start within 90 seconds after setting ENGINE CONTROL switch to MANUAL START (or the remote start contacts are closed with the ENGINE CONTROL switch in AUTO START), GSC declares overcrank condition starting is disabled.

CORRECTIVE ACTION

Correct any displayed faults per WP 0009 or troubleshoot per WP 0011.

SYMPTOM

6. FAULT SHUTDOWN light flashing red for shut down.

MALFUNCTION

CID and FMI fault codes displayed.

CORRECTIVE ACTION

Troubleshoot displayed CID and FMI codes (WP 0009).

MALFUNCTION

SP1, SP2, SP3, or SP4 displayed. DIAG not on.

CORRECTIVE ACTION

Troubleshoot displayed SP (Spare Input) code (WP 0007).

MALFUNCTION

AL1 thru AL8 fault code displayed. DIAG not on.

CORRECTIVE ACTION

Troubleshoot displayed AL code (WP 0008).

TROUBLESHOOTING USING DEDICATED SHUTDOWN INDICATORS - Continued

SYMPTOM

7. FAULT ALARM light flashing yellow.

MALFUNCTION

CID and FMI fault codes display. Evaluate with dedicated shutdown indicators.

CORRECTIVE ACTION

Troubleshoot CID and FMI codes (WP 0009).

MALFUNCTION

SP1, SP2, SP3, or SP4 displayed. DIAG not on.

CORRECTIVE ACTION

Troubleshoot displayed SP code (WP 0007).

MALFUNCTION

AL1 thru AL8 fault code displayed. DIAG not on.

CORRECTIVE ACTION

Troubleshoot displayed AL code (WP 0008).

SYMPTOM

8. No indicator lit. DIAG not on. Fault codes displayed.

MALFUNCTION

CID and FMI codes displayed.

CORRECTIVE ACTION

Troubleshoot displayed CID and FMI codes (WP 0009).

MALFUNCTION

SP1, SP2, SP3, or SP4 displayed.

CORRECTIVE ACTION

Troubleshoot displayed SP code (WP 0007).

MALFUNCTION

AL1 thru AL8 fault code displayed.

CORRECTIVE ACTION

Troubleshoot displayed AL code (WP 0008).

TROUBLESHOOTING USING DEDICATED SHUTDOWN INDICATORS - Continued

SYMPTOM

9. No indicator lit. DIAG not on. No fault codes displayed.

MALFUNCTION

Undiagnosed shutdown.

CORRECTIVE ACTION

Troubleshoot fault without code (WP 0011).

END OF WORK PACKAGE

FIELD LEVEL TROUBLESHOOTING
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
SP FAULT CODE TROUBLESHOOTING PROCEDURES

INITIAL SETUP:

Personnel Required	References
One	WP 0083 TM 9-6115-730-10

TROUBLESHOOTING USING SP FAULT CODES

SP (Spare Input) Fault Codes are associated with four inputs that are considered spare inputs. Spare fault code programming is contained in OP6-0, Protective Relay Programming (see WP 0083, Table 7 for details). These codes are not stored in the GSC fault log. When a spare input fault is detected, the FAULT SHUTDOWN lamp flashes and the corresponding code (SP1, SP2, etc.) is displayed on the upper GSC display. Fault condition on SP 1 and 4 is programmed to shut down the engine immediately.

WARNING

Fuels used in the generator set are flammable. When filling the fuel tank, maintain metal-to-metal contact between filler nozzle and fuel tank opening to eliminate static electrical discharge. Failure to comply can result in flames and possible explosion and cause injury or death to personnel and damage to the generator set.

Fuels used with the generator set are flammable. Do not smoke or use open flames when performing maintenance. Failure to comply can result in flames and possible explosion and can cause injury or death to personnel and damage to the generator set.

NOTE

SP1 thru SP4 must be evaluated using dedicated shutdown lights, alarm conditions, and available fault codes.

TROUBLESHOOTING USING SP FAULT CODES - Continued

SYMPTOM

1. SP1

MALFUNCTION

Low Fuel Level.

CORRECTIVE ACTION

STEP 1. Verify if LOW FUEL LEVEL indicator on Alarm Module is lit.

STEP 2. Verify fuel level on fuel level gage.

STEP 3. If using internal fuel source, perform fuel service and refill TQG per TM 9-6115-730-10.

STEP 4. If using external (auxiliary) source, verify that auxiliary fuel line is connected per TM 9-6115-730-10 and that AUX FUEL pump switch is set to ON.

STEP 5. Verify that external (auxiliary) fuel is present and clean.

STEP 6. If external (auxiliary) fuel is present and clean, troubleshoot auxiliary fuel pump (WP 0011, SYMPTOM 30).

STEP 7. Verify the problem has been resolved.

SYMPTOM

2. SP2

MALFUNCTION

DVR fault.

CORRECTIVE ACTION

STEP 1. Troubleshoot DVR fault per WP 0010.

STEP 2. Verify the problem has been resolved.

TROUBLESHOOTING USING SP FAULT CODES - Continued

NOTE

SP3 and SP4 active during paralleling only.

SYMPTOM

3. SP3

MALFUNCTION

Bus Frequency Fault (Paralleling Only)

When main contactor relay K1 is energized and one or both of the following is true for more than 2 seconds an SP2 fault is announced: The difference in frequency between the generator and the bus is greater than 0.2 Hz. The difference in phase between the generator and the bus is greater than 10 degrees. The GSC will stop synchronization process until the fault is cleared and corrected.

CORRECTIVE ACTION

STEP 1. Verify that no fault codes are listed on upper display.

STEP 2. Verify equipment setup is correct per TM 9-6115-730-10.

STEP 3. Verify equipment setup and parameters for synchronization (WP 0083, Table 6).

STEP 4. Restart generator sets.

STEP 5. Adjust and evaluate operation using synchronization lights per TM 9-6115-730-10.

STEP 6. Operate per TM 9-6115-730-10.

STEP 7. Verify the problem has been resolved.

SYMPTOM

4. SP4

MALFUNCTION

Bus Voltage Fault (Paralleling Only)

Input is active when 208 or 416 VAC is detected on the load bus by dead bus relay low sensor (DBLO) or dead bus relay high sensor (DBHI). This input is compared to the reading of the bus. If the voltage of phase A is less than 20% of the rated voltage, it is considered to be dead. If the condition of these measurements is different with regards to presence or absence of bus voltage, a fault is announced.

CORRECTIVE ACTION

STEP 1. Verify that no fault codes are listed on upper display.

STEP 2. Verify equipment setup is correct TM 9-6115-730-10.

STEP 3. Verify equipment setup and parameters for synchronization (WP 0083, Table 6).

STEP 4. Restart generator sets.

STEP 5. Adjust and evaluate operation using synchronization lights per TM 9-6115-730-10.

TROUBLESHOOTING USING SP FAULT CODES - Continued

CORRECTIVE ACTION - Continued

STEP 6. Operate per TM 9-6115-730-10.

STEP 7. Verify the problem has been resolved.

END OF WORK PACKAGE

FIELD LEVEL TROUBLESHOOTING
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
AL FAULT CODE TROUBLESHOOTING PROCEDURES

INITIAL SETUP:

Personnel Required	References
One	WP 0083 TM 9-6115-730-10

TROUBLESHOOTING USING AL FAULT CODES

Alarm Fault Codes are shown on the upper display and consist of specific engine fault codes, protective relay function codes, and paralleling fault codes. Alarm Fault Codes rely upon programmed setpoints.

Engine fault code programming is contained in OP5-0, Engine/Generator Programming (see WP 0083 for details). Protective relay function code programming is contained in OP5-1, Protective Relay Programming (see WP 0083). Paralleling fault code programming is contained in OP5-3, Synchronization Programming (see WP 0083).

Alarm Fault codes are not stored in the GSC fault log.

WARNING

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

Dangerously high voltage can exist across current transformer (CT) output with engine running. CT could explode if disconnected from load with engine running. Do not disconnect CT with generator rotating. Failure to comply can cause serious injury or death to personnel.

Slave receptacle (NATO connector) is electrically live at all times and is unfused. The Battery Disconnect Switch does not remove power from the NATO connector. Use caution when connecting or disconnecting cable(s) to the NATO connector to prevent damage to equipment. Use caution when troubleshooting this circuit. This circuit is only dead when the batteries are fully disconnected. Failure to comply can cause serious injury or death to personnel.

TROUBLESHOOTING USING AL FAULT CODES - Continued

WARNING

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/or liquids can result in burns and scalding. Shut down generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply can cause injury or death to personnel.

SYMPTOM

1. AL 1

MALFUNCTION

High Coolant Temperature

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to MANUAL START.

STEP 2. On GSC keypad, press ALARM CODES.

STEP 3. Verify AL1 appears on upper display. Check setpoints per WP 0083.

Verify GSC OP5-0 setpoint P015 (WP 0083, Table 4).

STEP 4. Verify if any fault codes or engine fault codes are displayed on upper display and record. If fault codes displayed, troubleshoot per WP 0009.

STEP 5. On EMCP set ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch is OFF; DEAD CRANK SWITCH is OFF.

STEP 6. Open right side engine access door and check coolant level in coolant recovery (overflow) bottle. If required, replace coolant per TM 9-6115-730-10, WP 0015.

STEP 7. Inspect coolant system lines for leaks per PMCS (WP 0016).

STEP 8. Inspect alternator and water pump belts. Check water pump belt tension.

a. If required, tighten water pump belt.

b. If required, replace alternator or water pump belts (WP 0075).

STEP 9. Inspect engine for damaged fan.

If fan damaged, repair per WP 0066.

STEP 10. Inspect radiator for obstructions or blockage. Remove obstructions or blockage if present.

STEP 11. Inspect radiator for damage. If radiator damaged, repair or replace (WP 0068).

STEP 12. Verify the problem has been resolved.

TROUBLESHOOTING USING AL FAULT CODES - Continued

SYMPTOM

2. AL 2

MALFUNCTION

Low Coolant Temperature

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to MANUAL START.

STEP 2. On GSC keypad, press ALARM CODES.

STEP 3. Verify AL2 appears on upper display.

NOTE

This fault will be displayed if the coolant temperature is below 70° F (programmable by setpoint P016), and may occur for a short time after start up.

STEP 4. Verify if any fault codes or engine fault codes are displayed on upper display and record.

a. If fault codes displayed, troubleshoot per fault code (WP 0009).

b. Verify setpoint P016 (WP 0083, Table 4).

STEP 5. Verify the problem has been resolved.

CAUTION

The dipstick is marked so that the crankcase oil can be checked while engine is running or stopped. Always make sure dipstick is checked. Remove oil filler cap when checking oil with engine running.

SYMPTOM

3. AL 3

MALFUNCTION

Low Engine Oil Pressure

Low engine operating speed can cause this alarm code. Note and record engine speed for reference.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to MANUAL START.

STEP 2. On GSC keypad, press ALARM CODES.

STEP 3. Verify AL3 appears on upper display.

STEP 4. Verify if any fault codes or engine fault codes are displayed on upper display and record.

TROUBLESHOOTING USING AL FAULT CODES - Continued

CORRECTIVE ACTION - Continued

STEP 5. Check engine oil level and service engine if oil is low per TM 9-6115-730-10.

STEP 6. If fault codes displayed, troubleshoot per fault code (WP 0009).

STEP 7. Verify setpoints P013 or P014 (WP 0083, Table 4).

STEP 8. Verify the problem has been resolved.

SYMPTOM

4. AL 4

MALFUNCTION

Fault Detected by Engine ECM

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. On GSC keypad, press ALARM CODES.

STEP 3. Verify AL4 appears on upper display.

STEP 4. Verify if any fault codes or engine fault codes are displayed on upper display and record. Troubleshoot per displayed fault codes (WP 0009).

STEP 5. Verify the problem has been resolved.

WARNING

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/or liquids can result in burns and scalding. Shut down generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply can cause injury or death to personnel.

SYMPTOM

5. AL 5

MALFUNCTION

Low Engine Coolant Level

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. On GSC keypad, press ALARM CODES.

STEP 3. Verify AL5 appears on upper display.

STEP 4. Verify if any fault codes or engine fault codes are displayed on upper display and record.

TROUBLESHOOTING USING AL FAULT CODES - Continued

CORRECTIVE ACTION - Continued

STEP 5. Inspect coolant system lines for leaks.

STEP 6. Inspect engine coolant system per PMCS (WP 0016).

STEP 7. Open right engine access door and check engine coolant level in coolant recovery (overflow) bottle. Check if coolant is low and service surge tank WP 0065.

STEP 8. Troubleshoot per displayed fault codes and WP 0009.

STEP 9. Verify the problem has been resolved.

SYMPTOM

6. AL 7

MALFUNCTION

Generator Over Voltage

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to MANUAL START.

STEP 2. On GSC keypad, press ALARM CODES.

STEP 3. Verify AL7 appears on upper display.

STEP 4. Verify if any faults are displayed on DVR. Check set points per WP 0083.

STEP 5. If overvoltage 702 present, go to WP 0010, SYMPTOM 7 and troubleshoot.

STEP 6. Verify that the problem has been resolved.

STEP 7. Troubleshoot per WP 0009, CID 1169 FMI 02, SYMPTOM 62.

STEP 8. Verify if any fault codes displayed and record.

STEP 9. If problem has not been resolved, troubleshoot per WP 0009.

STEP 10. Verify that the problem has been resolved.

SYMPTOM

7. AL 8

MALFUNCTION

Generator Under Voltage

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to MANUAL START.

STEP 2. On GSC keypad, press ALARM CODES.

STEP 3. Verify AL8 appears on upper display.

TROUBLESHOOTING USING AL FAULT CODES - Continued

CORRECTIVE ACTION - Continued

STEP 4. Verify if any faults are displayed on DVR. Check set points per WP 0083.

a. If no DVR fault codes are displayed, check ATB fuses (FO-1, Sheet 5).

b. If DVR fault code 701 is present, go to WP 0010, SYMPTOM 6 and troubleshoot.

STEP 5. Verify that the problem has been resolved.

STEP 6. Troubleshoot per WP 0009, CID 1169 FMI 02, SYMPTOM 62.

STEP 7. Verify if any fault codes displayed and record.

STEP 8. If problem has not been resolved, troubleshoot per WP 0009.

STEP 9. Verify that the problem has been resolved.

SYMPTOM

8. AL 9

MALFUNCTION

Generator Over Frequency

CORRECTIVE ACTION

STEP 1. On keypad, press ALARM CODES.

STEP 2. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to MANUAL START.

STEP 3. On GSC keypad, press ALARM CODES.

STEP 4. Verify AL9 appears on upper display.

STEP 5. Verify if any fault codes or engine fault codes are displayed on upper display and record.

a. Troubleshoot fault code and WP 0009, CID 362 E FMI 01 (SYMPTOM 42).

b. Verify OP5-0 engine/generator setpoints (WP 0083, Table 4).

STEP 6. Verify the problem has been resolved.

SYMPTOM

9. AL 10

MALFUNCTION

Generator Under Frequency

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to MANUAL START.

STEP 2. On GSC keypad, press ALARM CODES.

TROUBLESHOOTING USING AL FAULT CODES - Continued

CORRECTIVE ACTION - Continued

STEP 3. Verify AL10 appears on upper display.

STEP 4. Verify if any fault codes or engine fault codes are displayed on upper display and record.

STEP 5. Troubleshoot per WP 0011, Engine Cannot Reach Operating RPM (SYMPTOM 26).

STEP 6. Verify the problem has been resolved.

NOTE

This alarm code should occur only when the generator sets are operated in parallel mode.

SYMPTOM

10. AL 11

MALFUNCTION

Generator Reverse Power

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch is OFF; DEAD CRANK SWITCH is OFF.

STEP 2. Verify that paralleling cables are securely connected between generator sets to be paralleled.

STEP 3. Verify that load cables are connected properly by observing proper phase polarity.

STEP 4. Verify that generator sets are set for same output voltage.

STEP 5. Parallel generator sets in accordance with TM 9-6115-730-10.

a. Verify the problem has been resolved.

b. If problem remains, visually inspect for damage, and check continuity between pins on paralleling cables.

c. If problem remains, verify if any fault codes or engine fault codes are displayed on GSC upper display and record.

STEP 6. Troubleshoot per displayed fault codes and WP 0009.

STEP 7. Verify protective relay function code disabled by setpoint P125 (WP 0083).

STEP 8. Enable protective relay function code setpoint P125 (WP 0083, Table 5).

STEP 9. Verify the problem has been resolved.

TROUBLESHOOTING USING AL FAULT CODES - Continued

SYMPTOM

11. AL 12

MALFUNCTION

Phase Over Current

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to MANUAL START.

STEP 2. Verify that generator set load is properly balanced between each of the three phases and that the generator set is not overloaded.

STEP 3. Verify that problem is resolved. If not, continue to the next step.

STEP 4. On GSC keypad, press ALARM CODES.

STEP 5. Verify AL12 appears on upper display.

STEP 6. Verify OP5-1 setpoints P128 thru P137 (WP 0083, Table 5).

a. If setpoints are changed, verify that the problem has been resolved.

b. If setpoints are not changed, verify if any fault codes or engine fault codes are displayed on GSC upper display and record.

STEP 7. Troubleshoot per displayed fault codes and WP 0009.

STEP 8. Verify the problem has been resolved.

STEP 9. If not, replace Overload/Short Circuit Module (WP 0042)

SYMPTOM

12. AL 13

MALFUNCTION

Generator Total Over Current

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to MANUAL START.

STEP 2. Verify that generator set load is properly balanced between each of the three phases and that the generator set is not overloaded.

STEP 3. Verify that problem is resolved. If not, continue to the next step.

STEP 4. On GSC keypad, press ALARM CODES.

STEP 5. Verify AL13 appears on upper display.

STEP 6. Verify OP5-1 setpoints P128 thru P137 (WP 0083, Table 5).

a. If setpoints are changed, verify that the problem has been resolved.

b. If setpoints are not changed, verify if any fault codes or engine fault codes are displayed on GSC upper display and record.

TROUBLESHOOTING USING AL FAULT CODES - Continued

CORRECTIVE ACTION - Continued

STEP 7. Troubleshoot per displayed fault codes and WP 0009.

STEP 8. Verify the problem has been resolved.

STEP 9. If not, replace Overload/Short Circuit Module (WP 0042).

SYMPTOM

13. AL 14

MALFUNCTION

Phase A No Voltage Input at GSC input (P7-10)

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to MANUAL START.

STEP 2. Verify that generator set load is properly balanced between each of the three phases and that the generator set is not overloaded.

STEP 3. Verify that problem is resolved. If not, continue to the next step.

STEP 4. On GSC keypad, press ALARM CODES.

STEP 5. Verify AL14 appears on upper display. Check setpoints per WP 0083.

STEP 6. Troubleshoot A5F1 on AC transformer box (ATB) A5 per WP 0011, SYMPTOM 4.

STEP 7. If indicated, replace A5F1 on back of ATB A5 (WP 0042).

a. Verify the problem has been resolved.

b. If not, replace ATB A5 (WP 0042).

STEP 8. Verify that problem has been resolved.

SYMPTOM

14. AL 15

MALFUNCTION

GSC Configuration Error

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. On GSC keypad, press ALARM CODES.

STEP 3. Verify AL15 appears on upper display. Check setpoints per WP 0083, Table 1, Table 3, and Table 5.

STEP 4. Verify if any fault codes or engine fault codes are displayed on upper display and record.

a. Troubleshoot per displayed fault codes and WP 0009.

b. Turn ENGINE CONTROL switch to MANUAL START.

TROUBLESHOOTING USING AL FAULT CODES - Continued

CORRECTIVE ACTION - Continued

c. Verify that engine speed rpm is for correct output frequency by pressing ENGINE METER key on GSC.

1800 rpm for 60 Hz

1500 rpm for 50 Hz

STEP 5. Verify the problem has been resolved.

NOTE

This alarm code should occur only when the generator sets are operated in parallel mode.

SYMPTOM

15. AL 16

MALFUNCTION

Incorrect Phase Sequence - Paralleling fault code

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF. Turn the ENGINE CONTROL switch to OFF/RESET.

STEP 2. Verify that paralleling cables are securely connected between generator sets to be paralleled.

STEP 3. Verify that generator sets are set for same output voltage.

STEP 4. Parallel generator sets per TM 9-6115-730-10.

a. Verify the problem has been resolved.

b. If problem remains, verify if any fault codes or engine fault codes are displayed on GSC upper display and record.

STEP 5. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to MANUAL START.

STEP 6. Verify that load cables are connected properly by observing proper phase polarity.

STEP 7. On GSC keypad, press ALARM CODES.

STEP 8. Verify AL16 appears on upper display. Check setpoints per WP 0083.

STEP 9. Verify if any fault codes or engine fault codes are displayed on upper display and record.

a. On EMCP set SYNC MODE switch to OFF.

b. Troubleshoot per displayed fault codes and WP 0009.

STEP 10. Verify the problem has been resolved.

TROUBLESHOOTING USING AL FAULT CODES - Continued

NOTE

This alarm code should occur only when the generator sets are operated in parallel mode.

SYMPTOM

16. AL 17

MALFUNCTION

Improper Generator or Bus Voltage - Paralleling fault code

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to MANUAL START.

STEP 2. On generator set GSC displays, check the voltages on for both generator sets and record output voltages for all phases. All phases should be the same for both generator sets.

STEP 3. On EMCP of both generator sets, set ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch to OFF; DEAD CRANK SWITCH to OFF.

STEP 4. Check both generator sets and verify that all cables are connected properly and all load terminal connections are tight per TM 9-6115-730-10.

STEP 5. Parallel generator sets per TM 9-6115-730-10.

STEP 6. Verify the problem has been resolved.

STEP 7. If problem remains, set AC CIRCUIT INTERRUPTER switch on GSC to OPEN.

a. On generator set #1, set AC CIRCUIT INTERRUPTER switch on GSC to CLOSED.

b. Measure voltage at output load terminal lugs and record.

c. On generator set #1, set AC CIRCUIT INTERRUPTER switch on GSC to OPEN.

d. On generator set #2, set AC CIRCUIT INTERRUPTER switch on GSC to CLOSED.

e. Measure voltage at output load terminal lugs and record.

f. On generator set #2, set AC CIRCUIT INTERRUPTER switch on GSC to OPEN.

STEP 8. If voltages at output load terminal lugs are different, adjust generator set voltages equal to each other.

STEP 9. Parallel generator sets per TM 9-6115-730-10.

STEP 10. Verify the problem has been resolved.

STEP 11. If not resolved, check wiring at LSM A4.

STEP 12. If wiring at LSM A4 is good, replace LSM A4 (WP 0042).

TROUBLESHOOTING USING AL FAULT CODES - Continued

NOTE

This alarm code should occur only when the generator sets are operated in parallel mode.

SYMPTOM

17. AL 18

MALFUNCTION

Synchronizer Time-out - Paralleling fault code

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to MANUAL START.

STEP 2. On keypad, press ALARM CODES.

STEP 3. Verify AL18 appears on upper display. Check setpoints per WP 0083.

STEP 4. Verify if any fault codes or engine fault codes are displayed on upper display and record.

STEP 5. Troubleshoot per displayed fault codes and WP 0009.

STEP 6. On EMCP set SYNC MODE switch to OFF.

STEP 7. Check all paralleling connections to load per TM 9-6115-730-10.

STEP 8. Verify the problem has been resolved.

END OF WORK PACKAGE

FIELD LEVEL TROUBLESHOOTING
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
GSC FAULT CODE TROUBLESHOOTING PROCEDURES

INITIAL SETUP:

Tools and Special Tools

Multimeter

Personnel Required

One

References

WP 0083
FO-1
FO-2
FO-3
FO-4
TM 9-6115-730-10

TROUBLESHOOTING USING GSC FAULT CODES

WARNING

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

Ensure that the engine cannot be started while maintenance is being performed. (ENGINE CONTROL switch set to OFF/RESET. Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF.)

TROUBLESHOOTING USING GSC FAULT CODES - Continued

NOTE

CID 1 thru CID 6 are for the unit fuel injectors in cylinders 1 through 6 respectively. The ECM is capable of detecting the following conditions:

Open circuit in injector wiring
Open circuit in the internal wiring of the injector
Short to ground
Injector internal short circuit
Short to B+

SYMPTOM

1. CID 1 E FMI 06

   CID 1 E FMI 11

MALFUNCTION

Cylinder 1.

FMI 06 – Injector Current Fault.

FMI 11 - Failure Mode is Not Identifiable (Mechanical Failure).

CORRECTIVE ACTION

STEP 1. On EMCP, turn ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch is OFF, DEAD CRANK SWITCH is OFF.

STEP 2. Inspect connectors ENG-P2 and ENG-P1 on engine harness (FO-2, sheet 1).

STEP 3. Conduct an appropriate pull test on wires in the ENG-P2 and ENG-P1 connectors to ensure wires are tight and secure.

STEP 4. Check the wires on the engine harness (ENG-P2 connector to ENG-P1 connector) and the fuel injector harness (ENG-J300 connector to fuel injectors) for abrasion and pinch points (WP 0088).

Repair the connectors or wiring and/or replace the connectors or wiring, if necessary (WP 0088).

STEP 5. Perform Injector Solenoid Test (WP 0013, SYMPTOM 5).

STEP 6. Verify the problem is resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

SYMPTOM

2. CID 1 E FMI 06
   CID 2 E FMI 11

MALFUNCTION

Cylinder 2.

FMI 06 – Injector Current Fault.

FMI 11 - Failure mode is not identifiable (Mechanical Failure).

CORRECTIVE ACTION

Perform steps in SYMPTOM 1.

SYMPTOM

3. CID 1 E FMI 06
   CID 3 E FMI 11

MALFUNCTION

Cylinder 3.

FMI 06 – Injector Current Fault.

FMI 11 - Failure mode is not identifiable (Mechanical Failure).

CORRECTIVE ACTION

Perform steps in SYMPTOM 1.

SYMPTOM

4. CID 1 E FMI 06
   CID 4 E FMI 11

MALFUNCTION

Cylinder 4.

FMI 06 – Injector Current Fault.

FMI 11 - Failure mode is not identifiable (Mechanical Failure).

CORRECTIVE ACTION

Perform steps in SYMPTOM 1.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

SYMPTOM

5. CID 1 E FMI 06
   CID 5 E FMI 11

MALFUNCTION

Cylinder 5.

FMI 06 – Injector Current Fault.

FMI 11 - Failure mode is not identifiable (Mechanical Failure).

CORRECTIVE ACTION

Perform steps in SYMPTOM 1.

SYMPTOM

6. CID 1 E FMI 06
   CID 6 E FMI 11

MALFUNCTION

Cylinder 6.

FMI 06 – Injector Current Fault.

FMI 11 - Failure mode is not identifiable (Mechanical Failure).

CORRECTIVE ACTION

Perform steps in SYMPTOM 1.

SYMPTOM

7. CID 9 E FMI 02

MALFUNCTION

High Altitude Degradation.

FMI 02 - Erratic, Intermittent, or Incorrect Signal.

Event Code. Engine power lowered because of altitude. Higher the altitude, the lower the air density. Clean dense air is needed for efficient combustion.

CORRECTIVE ACTION

Check for related alarm codes or fault codes and troubleshoot (WP 0008 and/or WP 0009).

TROUBLESHOOTING USING GSC FAULT CODES - Continued

NOTE

Pins 4 (+) and 5 (-) of ECM connector J2 is an 8 Vdc supply. This is supplied by the ECM for an accelerator pedal control when this engine is used in a truck. This supply is not used on the generator set.

SYMPTOM (Not Applicable)

8. CID 41 FMI 02
   CID 41 FMI 03
   CID 41 FMI 04

MALFUNCTION

8 Volt Power Supply not Normal.

FMI 02 - Erratic, intermittent, or incorrect signal.

FMI 03 - Voltage above normal.

FMI 04 - Voltage below normal.

CORRECTIVE ACTION

STEP 1. Inspect wiring at ECM connector J2.

a. Repair or replace wiring, as required (WP 0088).

b. If wiring is not defective, replace ECM (WP 0082).

STEP 2. Verify the problem is resolved.

SYMPTOM

9. CID 85 E FMI 01

MALFUNCTION

Shutdown Overridden. Data is Valid but Data is Below Normal Operating Range.

Event Code. Red FAULT ALARM indicator flashes on GSC has detected a shutdown fault which was overridden (Battle Short).

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. Verify the Battle Short Switch is set to OFF.

STEP 3. Press ALARM CODES on GSC keypad.

STEP 4. Verify associated alarm code and fault code and troubleshoot (WP 0008 and/or WP 0009).

TROUBLESHOOTING USING GSC FAULT CODES - Continued

SYMPTOM

10. CID 91 FMI 08

MALFUNCTION

Throttle Position Signal.

FMI 08 - Abnormal Frequency, Pulse Width, or Period.

CORRECTIVE ACTION

STEP 1. On EMCP, turn ENGINE CONTROL switch to OFF/RESET. Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF.

STEP 2. Inspect connector ENG-P1 on ECM to EMCP harness (FO-2, Sheet 2). Inspect connector ENG-P300 on ECM to ENG-P300 harness (FO-2, Sheet 1).

STEP 3. Conduct an appropriate pull test on wires to ensure wires are tight and secure.

STEP 4. Check the wires on the ECM to EMCP harness for abrasion and pinch points (WP 0090).

Repair and/or replace the connectors and/or wiring (WP 0088), as necessary.

STEP 5. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 6. Measure 24 +/- 3 Vdc between terminal 15 (+) and terminal 16 (-) on LSM A4 (FO-4, sheet 2).

If 24 +/- 3 Vdc is not measured between terminal 15 (+) and terminal 16 (-) on the LSM A4, perform Speed Control Test (WP 0013, SYMPTOM 6, STEP 6).

STEP 7. Verify the problem is resolved.

STEP 8. If 24 +/- 3 Vdc is measured between terminal 15 (+) and terminal 16 (-) on LSM A4 (FO-4, Sheet 2), refer to WP 0013, SYMPTOM 6, STEP 3.

a. On EMCP, turn ENGINE CONTROL switch to MANUAL START.

b. Measure DC voltage between LSM A4 terminals 19 (+) and 20 (-). Measurement should be 3.1 Vdc @ 60 Hz under no load. If not, adjust speed trim potentiometer to bring signal to 3.1 Vdc and generator frequency to 60 Hz.

c. If PWM output of LSM A4 is low and/or cannot be adjusted to 3.1 Vdc, check speed trim potentiometer connections and test speed trim potentiometer resistance. If speed trim potentiometer is ok, replace LSM A4 (WP 0042).

STEP 9. Verify the problem has been resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

SYMPTOM

11. CID 94 FMI 01

CID 94 FMI 02

MALFUNCTION

Fuel Pressure Sensor.

FMI 01 - Data is Valid But Data is Below Normal Operating Range.

FMI 02 - Erratic, Intermittent, or Incorrect Signal.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. Disconnect engine harness connector ENG-J202 from fuel pressure sensor (WP 0088, Figure 1, sheet 1 and FO-2, sheet 1).

STEP 3. Measure voltage between ENG-J202-A (+) and ENG-J202-B (-) of harness connector (WP 0088, Figure 2, sheet 1).

a. If voltage is not present, repair or replace harness (WP 0088). Verify the problem has been resolved.

b. If repairing wiring does not resolve fault, replace the fuel pressure sensor (WP 0098). Verify the problem has been resolved.

c. If voltage is not present between ENG-J202-A (+) and ENG-J202-B (-) proceed to STEP 3d.

d. Remove ENG-P2 from ECM and verify continuity between ENG-J202-C and ENG-P2-16 per FO-2, sheet 1.

(1) If continuity is not present, repair or replace harness (WP 0088). Verify the problem has been resolved.

(2) If the problem is not resolved, replace ECM (WP 0082).

STEP 4. Verify the problem is resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

NOTE

This procedure is used for FMI codes 03 and 04 for all pressure sensors.

SYMPTOM

12. CID 94 E FMI 03

    CID 94 E FMI 04

MALFUNCTION

Fuel Pressure Sensor.

FMI 03 - Voltage Above Normal.

FMI 04 - Voltage Below Normal.

CORRECTIVE ACTION

STEP 1. On EMCP, turn ENGINE CONTROL switch to OFF/RESET. Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF.

STEP 2. Inspect connectors ENG-P2 on the engine harness (FO-2, sheet 1) and ENG-P1 on the ECM to EMCP Harness (FO-2, sheet 2).

STEP 3. Conduct an appropriate pull test on wires in the ENG-P2 and ENG-P1 connectors to ensure wires are tight and secure.

STEP 4. Check the wires on both harnesses for abrasion and pinch points (WP 0088).

Repair and/or replace the connectors and/or wiring (WP 0088).

STEP 5. If necessary, disconnect the harness connectors, for the fuel pressure sensor, oil pressure sensor, turbo outlet pressure sensor, atmospheric pressure sensor, and turbo inlet pressure sensor.

STEP 6. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 7. Measure 5.0 +/- 0.2 Vdc between terminals A (supply) and B (return) at each sensor connector.

a. If 5.0 +/- 0.2 Vdc is not measured on all sensor connectors, remove ENG-P2 from ECM J2. Check for 5.0 +/- 0.2 Vdc on the pins for the bad sensor reading (WP 0088 and FO-2 Sheet 1). Verify continuity of the signal wire (pin C) for the suspect sensor connector.

b. On EMCP, turn ENGINE CONTROL switch to OFF/RESET. Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is set to OFF.

   (1) If the voltage was present, repair/replace the ECM J2 engine harness (WP 0088).

   (2) If the voltage was not present, replace the ECM (WP 0082).

c. Reconnect all of the sensor connectors.

d. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP turn the ENGINE CONTROL switch to COOL DOWN/STOP. Retest the system.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

CORRECTIVE ACTION - Continued

e. If the problem is not resolved, proceed to STEP 8.

STEP 8. On EMCP, turn ENGINE CONTROL switch to OFF/RESET. Battery Disconnect Switch is OFF. DEAD CRANK SWITCH is set to OFF.

STEP 9. Disconnect the connector from the defective sensor.

a. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP turn the ENGINE CONTROL switch to COOL DOWN/STOP.

b. Check for a 03 diagnostic code.

c. On EMCP, turn ENGINE CONTROL switch to OFF/RESET. Battery Disconnect Switch is OFF. DEAD CRANK SWITCH is set to OFF.

d. Connect a jumper wire and connect to pins B and C of the bad sensor connector.

e. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP turn the ENGINE CONTROL switch to COOL DOWN/STOP.

f. Check for a 04 diagnostic code. If the correct code is present, the ECM is working OK. Replace the defective sensor (WP 0098).

g. If the diagnostic code remains 03, proceed to STEP 10.

STEP 10. On EMCP, turn ENGINE CONTROL switch to OFF/RESET. Battery Disconnect Switch is OFF. DEAD CRANK SWITCH is set to OFF. Remove the jumper wire.

STEP 11. Replace the ECM (WP 0082) and retest the system. Verify the problem is resolved.

SYMPTOM

13. CID 96 E FMI 01

MALFUNCTION

High Fuel Pressure Warning.

FMI 01 - Data is Valid but Data is Below Normal Operating Range.

Event Code. Indicates that sensor detects a fuel system backup to cause high pressure warning.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. Press ALARM CODES on GSC keypad.

STEP 3. Check for associated alarm code and fault code and troubleshoot (WP 0008 and/or WP 0009).

STEP 4. If no fault code, inspect fuel filter and fuel/water separator per PMCS (WP 0016) and perform service as required.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

SYMPTOM

14. CID 97 E FMI 01

MALFUNCTION

Derate Overridden.

FMI 01 - Data is Valid but Data is Below Normal Operating Range.

Event Code. Engine derate overridden. Verify presence of fault.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. Press ALARM CODES on GSC keypad.

STEP 3. Check for logged fault code, troubleshoot, and correct (WP 0008 and/or WP 0009).

STEP 4. Verify the problem is resolved.

NOTE

The following failure indicates that GSC is unable to receive valid data about oil pressure from ECM.

SYMPTOM

15. CID 100 E FMI 02

MALFUNCTION

Oil Pressure Sensor.

FMI 02 - Erratic, Intermittent, or Incorrect Signal.

CORRECTIVE ACTION

STEP 1. On EMCP, turn ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch is OFF, DEAD CRANK SWITCH is OFF.

STEP 2. Inspect connectors ENG-P2 on the engine harness (FO-2, sheet 1) and P1 on the ECM to EMCP Harness (FO-2, sheet 2).

STEP 3. Conduct an appropriate pull test on wires in the ENG-P2 and ENG-P1 connectors to ensure wires are tight and secure.

STEP 4. Disconnect ENG-P2 from ECM J2, ENG-P201 from the oil pressure sensor, and ENG-P202 from the fuel pressure sensor. Verify continuity from ENG-P201-A to ENG-P202-A and ENG-P2-2. Verify continuity from ENG-P201-B to ENG-P202-B and ENG-P2-3. Verify continuity from ENG-P201-C to ENG-P2-24.

STEP 5. Check the wires on both ENG-P1 and ENG-P2 harnesses for abrasion and pinch points (WP 0088).

STEP 6. If necessary, repair and/or replace the connectors and/or wiring (WP 0088).

TROUBLESHOOTING USING GSC FAULT CODES - Continued

CORRECTIVE ACTION - Continued

STEP 7. Disconnect the harness connectors, for the fuel pressure sensor, oil pressure sensor, injection actuation sensor, turbo outlet pressure sensor, atmospheric pressure sensor, and turbo inlet pressure sensor.

STEP 8. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 9. Measure 5.0 +/- 0.2 Vdc between terminals A (supply) and B (return) at each sensor connector.

If 5.0 +/- 0.2 Vdc is not measured on all sensor connectors, perform Electrical Connectors Wiggle Test (WP 0013, SYMPTOM 1).

STEP 10. If the problem is not resolved, replace the oil pressure sensor (WP 0098).

STEP 11. Retest the system. Verify that the problem has been cleared.

STEP 12 If the problem has not been resolved, replace ECM (WP 0082).

STEP 13. Retest the system and verify the problem has been resolved.

NOTE

The following failure is usually a broken wire, or a frayed wire shorting to an adjacent wire or to ground.

SYMPTOM

16. CID 100 E FMI 03

CID 100 E FMI 04

MALFUNCTION

Oil Pressure Sensor.

FMI 03 - Voltage Above Normal.

FMI 04 - Voltage Below Normal.

CORRECTIVE ACTION

Troubleshoot oil pressure sensor using steps in SYMPTOM 12.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

NOTE

This failure indicates that GSC is unable to receive any valid data about the coolant temperature from the ECM.

SYMPTOM

17. CID 110 E FMI 02

CID 110 E FMI 03

CID 110 E FMI 04

MALFUNCTION

Coolant Temperature Sensor.

FMI 02 - Erratic, Intermittent, or Incorrect Signal.

FMI 03 - Voltage Above Normal.

FMI 04 - Voltage Below Normal.

CORRECTIVE ACTION

STEP 1. On EMCP, turn ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch is OFF, DEAD CRANK SWITCH is OFF.

STEP 2. Inspect connectors ENG-P2 on the engine harness (FO-2, sheet 1) and ENG-P1 on the ECM to EMCP Harness (FO-2, sheet 2).

STEP 3. Conduct an appropriate pull test on wires in the ENG-P2 and ENG-P1 connectors to ensure wires are tight and secure.

STEP 4. Check the wires on both harnesses for abrasion and pinch points (WP 0088).

Repair and/or replace the connectors and/or wiring (WP 0088).

STEP 5. Disconnect engine harness connector ENG-P100 from coolant temperature sensor (WP 0088, Figure 1, sheet 1, and FO-2, sheet 1).

STEP 6. Connect a new sensor to engine harness connector ENG-P100, but do not install the sensor into the engine.

STEP 7. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 8. On GSC keypad, press GSC ALARM CODES button.

a. If the fault has cleared, replace coolant temperature sensor (WP 0098). Verify the problem has been resolved.

b. If the fault has not cleared, continue with STEP 9.

STEP 9. Turn ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch is OFF, DEAD CRANK SWITCH is OFF.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

CORRECTIVE ACTION - Continued

STEP 10. Remove engine harness connector ENG-P100 from the new sensor. Leave ENG-P100 disconnected.

a. Use a jumper wire long enough to reach from engine harness connector ENG-P100-1 to the engine ground stud.

b. Install jumper wire onto ENG-P100-1.

STEP 11. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 12. On GSC keypad, press GSC ALARM CODES button.

a. Verify a diagnostic code 03 appears.

b. Short the jumper wire (ENG-P100-1) to the engine ground.

c. Verify a diagnostic code 04 appears. This verifies the ECM is working properly.

STEP 13. Turn ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch is OFF, DEAD CRANK SWITCH is OFF.

STEP 14. Remove the jumper wire and connect all wires and connectors.

If a diagnostic code 03 and/or a diagnostic code 04 did not appear in STEP 13, repair or replace the engine harness. Verify the problem has been resolved.

STEP 15. If the problem is not resolved, replace ECM (WP 0082).

STEP 16. Verify the problem is resolved.

NOTE

The low coolant sensor is powered by 8 Vdc from the GSC. When coolant is present at the sensor, a logic low (near zero volts) is sent to the GSC. When coolant is not present at the sensor, a logic high is sent to the GSC.

SYMPTOM

18. CID 111 E FMI 03
CID 111 E FMI 04

MALFUNCTION

Low Coolant Sensor.

FMI 03 - Voltage Above Normal.

FMI 04 - Voltage Below Normal.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. Disconnect ECM to EMCP harness connector ENG-P16 from low coolant sensor (WP 0088, Figure 1 sheet 2, and FO-2, sheet 2).

TROUBLESHOOTING USING GSC FAULT CODES - Continued

CORRECTIVE ACTION - Continued

STEP 3. Measure the voltage on the ECM to EMCP harness connector between ENG-P16-A (+) and ENG-P16-B (-). Also measure the voltage between ENG-P16-C (+) and ENG-P16-B (-).

If the voltage between ENG-P16-A (+) and ENG-P16-B (-) is not 7.5 to 8.5 Vdc or voltage between ENG-P16-C (+) and ENG-P16-B (-) is not 2.0 to 3.0 Vdc, repair or replace ECM to EMCP harness (WP 0088).

STEP 4. If repairing or replacing the ECM to EMCP harness does not correct the problem, replace the low coolant sensor (WP 0098).

STEP 5. If replacing the low coolant sensor does not correct the problem, proceed to STEP 6.

STEP 6. Turn ENGINE CONTROL switch to OFF/RESET. Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF.

STEP 7. Disconnect the defective sensor connector.

a. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP turn the ENGINE CONTROL switch to COOL DOWN/STOP.

b. Check for a 03 diagnostic code.

c. On EMCP, turn ENGINE CONTROL switch to OFF/RESET. Battery Disconnect Switch is OFF. DEAD CRANK SWITCH is set to OFF.

d. Connect a jumper wire and connect to pins B and C of the bad sensor connector.

e. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP turn the ENGINE CONTROL switch to COOL DOWN/STOP.

f. Check for a 04 diagnostic code. If the correct code is present, the ECM is working OK. Replace the defective sensor (WP 0098).

g. If the diagnostic code remains 03, proceed to STEP 8.

STEP 8. On EMCP, turn ENGINE CONTROL switch to OFF/RESET. Battery Disconnect Switch is OFF. DEAD CRANK SWITCH is set to OFF. Remove the jumper wire.

STEP 9. Replace the ECM (WP 0082) and retest the system. Verify the problem is resolved.

STEP 10. Verify the problem has been resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

SYMPTOM

19. CID 168 E FMI 02
    CID 168 E FMI 03
    CID 168 E FMI 04

MALFUNCTION

Electrical System Voltage.

FMI 02 - Erratic, Intermittent, or Incorrect Signal.

FMI 03 - Voltage Above Normal.

FMI 04 - Voltage Below Normal.

CORRECTIVE ACTION

STEP 1. On EMCP, turn ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch is OFF, DEAD CRANK SWITCH is OFF.

STEP 2. Inspect connector ENG-P2 on the Engine Harness (FO-2, sheet 1) and connector ENG-P1 on the ECM to EMCP Harness (FO-2, sheet 2).

STEP 3. Conduct an appropriate pull test on wires in the ENG-P2 and ENG-P1 connectors to ensure wires are tight and secure.

STEP 4. Check the wires on both harnesses for abrasion and pinch points (WP 0088).

Repair and/or replace the connectors and/or wiring (WP 0088).

STEP 5. Perform Electrical Power Supply Test (WP 0013, SYMPTOM 2).

STEP 6. Verify the problem has been resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

SYMPTOM

20. CID 169 E FMI 01

MALFUNCTION

Engine Oil Maintenance Required.

FMI 01 - Data is valid but data is below normal operating range.

Event Code. Engine oil change is required.

CORRECTIVE ACTION

STEP 1. Perform engine oil and filter change (WP 0079).

STEP 2. Set Battery Disconnect Switch to ON; Set DEAD CRANK SWITCH to NORMAL. On EMCP, turn ENGINE CONTROL switch to COOL DOWN/ STOP.

STEP 3. Reset CATSW2 after oil filter and oil are changed.

STEP 4. Record engine oil maintenance.

STEP 5. Verify the fault code has cleared.

SYMPTOM

21. CID 170 E FMI 01

MALFUNCTION

Fuel Filter Change Required.

FMI 01 - Data is valid but data is below normal operating range.

Event Code. Inspect fuel filter for leaks, proper mounting, cracks, damage, or missing parts and change fuel filter.

CORRECTIVE ACTION

STEP 1. Perform fuel filter change (WP 0080).

STEP 2. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP, turn ENGINE CONTROL switch to COOL DOWN/ STOP.

STEP 3. Reset CATSW1 after fuel filter change.

STEP 4. Record fuel filter maintenance.

STEP 5. Verify the fault code has cleared.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

NOTE

The following codes are generated when the intake air manifold temperature sensor sees a temperature greater than 194° F (90° C) for two seconds or longer (FMI 00); or greater than 228° F (109° C) (FMI 11) for two seconds or longer. This problem is often caused by one of the following:

Incorrect fuel injection timing
Low air inlet system pressure
Restriction in air inlet

SYMPTOM

22. CID 172 E FMI 00
CID 172 E FMI 03
CID 172 E FMI 04
CID 172 E FMI 11

MALFUNCTION

Intake manifold air temperature sensor.

FMI 00 - Data is Valid but Data is Above Normal Operating Range.

FMI 03 - Voltage above normal.

FMI 04 - Voltage below normal.

FMI 11 - Failure mode is not identifiable (Mechanical Failure)

CORRECTIVE ACTION

STEP 1. Inspect and service air cleaner per TM 9-6115-730-10.

STEP 2. If air cleaner required service, verify the fault code has cleared. If not continue to the next step.

STEP 3. On EMCP, turn ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch is OFF, DEAD CRANK SWITCH is OFF.

STEP 4. Inspect connectors ENG-P2 on the engine harness (FO-2, sheet 1) and ENG-P1 on the ECM to EMCP Harness (FO-2, sheet 2).

STEP 5. Conduct an appropriate pull test on wires in the ENG-P2 and ENG-P1 connectors to ensure wires are tight and secure.

STEP 6. Check the wires on both harnesses for abrasion and pinch points (WP 0088).

Repair and/or replace the connectors and/or wiring (WP 0088).

TROUBLESHOOTING USING GSC FAULT CODES - Continued

CORRECTIVE ACTION – Continued

STEP 7. Disconnect engine harness connector ENG-P103 from intake manifold air temperature sensor (WP 0088, Figure 1, sheet 1, and FO-2, sheet 1).

a. Use a jumper wire long enough to reach from engine harness connector P103-1 to the engine ground stud.

b. Install jumper wire onto P103-1.

STEP 8. Set Battery Disconnect Switch to ON, Set DEAD CRANK SWITCH to NORMAL. Turn ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 9. On GSC keypad, press GSC ALARM CODES button.

a. Verify a diagnostic code 03 appears.

b. Short the jumper wire (ENG-P103-1) to the engine ground.

c. Verify a diagnostic code 04 appears. This verifies the ECM is working properly.

STEP 10. Turn ENGINE CONTROL switch to OFF/RESET. Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF.

STEP 11. Remove the jumper wire and connect all wires and connectors.

If a diagnostic code 03 and/or a diagnostic code 04 did not appear in STEP 9, check continuity between ENG-P103-1 to ENG-P2-35 and between ENG-P103-2 to ENG-P2-18, P100-2, and P105-2. Repair or replace the engine harness (WP 0088) as necessary.

STEP 12. If the problem is not resolved, replace intake manifold air temperature sensor (WP 0098).

STEP 13. Verify the problem is resolved. If not, replace ECM (WP 0082).

STEP 14. Verify the fault code has cleared.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

SYMPTOM

23. CID 174 FMI 03

CID 174 FMI 04

MALFUNCTION

Fuel Temperature Sensor.

FMI 03 - Voltage Above Normal.

FMI 04 - Voltage Below Normal.

CORRECTIVE ACTION

STEP 1. On EMCP, turn ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch is OFF, DEAD CRANK SWITCH is OFF.

STEP 2. Inspect connectors ENG-P2 on the engine harness (FO-2, sheet 1) and ENG-P1 on the ECM to EMCP Harness (FO-2, sheet 2).

STEP 3. Conduct an appropriate pull test on wires in the ENG-P2 and ENG-P1 connectors to ensure wires are tight and secure.

STEP 4. Check the wires on both harnesses for abrasion and pinch points (WP 0088).

Repair and/or replace the connectors and/or wiring (WP 0088).

STEP 5. Disconnect engine harness connector ENG-P105 from fuel temperature sensor (WP 0088, Figure 1, sheet 1, and FO-2, sheet 1).

a. Use a jumper wire long enough to reach from engine harness connector P105-1 to the engine ground stud.

b. Install jumper wire onto P105-1.

STEP 6. Set Battery Disconnect Switch to ON, Set DEAD CRANK SWITCH to NORMAL. Turn ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 7. On GSC keypad, press GSC ALARM CODES button.

a. Verify a diagnostic code 03 appears.

b. Short the jumper wire (ENG-P105-1) to the engine ground.

c. Verify a diagnostic code 04 appears. This verifies the ECM is working properly.

STEP 8. Turn ENGINE CONTROL switch to OFF/RESET. Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF.

STEP 9. Remove the jumper wire and connect all wires and connectors.

If a diagnostic code 03 and/or a diagnostic code 04 did not appear in STEP 7, check continuity between ENG-P105-1 to ENG-P2-33 and between ENG-P105-2 to ENG-P2-18, P100-2, and P105-2. Repair or replace the engine harness (WP 0088) as necessary.

STEP 10. If the problem is not resolved, replace fuel temperature sensor (WP 0098).

STEP 11. Verify the problem is resolved. If not, replace ECM (WP 0082).

STEP 12. Verify the fault code has cleared.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

NOTE

The magnetic pickup unit (MPU) on this engine is located at the rear of the engine on the flywheel housing.

SYMPTOM

24. CID 190 FMI 02

CID 190 FMI 03

MALFUNCTION

Loss of Engine Speed Signal.

Magnetic pickup unit (engine speed sensor).

FMI 02 - Erratic, intermittent, or incorrect signal.

FMI 03 - Voltage above normal.

CORRECTIVE ACTION

STEP 1. Turn the ENGINE CONTROL switch to OFF/RESET.

STEP 2. Disconnect ENG-P14 from the magnetic pickup unit (MPU) (WP 0088, Figure 2, Sheet 2, and FO-2, Sheet 2).

STEP 3. Measure MPU resistance.

a. If resistance is not 100 to 350 ohms, replace the MPU (WP 0098).

b. If resistance is correct, set DVM to AC volts. Turn DEAD CRANK SWITCH to CRANK. Measure 2 to 3 Vac from ground to ENG P14-1 and ENG P14-2 (MPU pigtail connector).

(1) If voltage measurement is not OK, adjust the MPU (WP 0098). Verify the problem is resolved. If not, the MPU is damaged or it is not functioning. Replace the magnetic pickup unit (WP 0098). Verify the problem is resolved.

(2) If the voltage measurement is OK, the MPU is functioning OK. Replace LSM A4 (WP 0041). Verify the problem is resolved.

STEP 4. Reconnect ENG-P14 to the MPU).(WP 0088, Figure 2, sheet 2, andFO-2, sheet 2). Disconnect ENG-P37 from the back of the GSC. Measure resistance between ENG-P37-1 and ENG-P37-2. Resistance should be 100 to 350 ohms.

a. If resistance is not 100 to 350 ohms, troubleshoot wiring harness between ENG-P37 and ENG-P14 (WP 0088). Repair as necessary (WP 0088). Verify the problem has been resolved.

b. If the problem has not been resolved, troubleshoot wiring between EMCP J37-1 to GSC P7-1 and EMCP J37-2 to GSC P7-2. Repair as necessary (WP 0090). Verify the problem has been resolved.

c. If the problem has not been resolved, check all GSC fuses (FO-4, Sheets 3 and 5).

d. If GSC fuses are ok, replace GSC (WP 0041).

STEP 5. Verify the problem has been resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

SYMPTOM

25. CID 190 E FMI 02

CID 190 E FMI 11

MALFUNCTION

Loss of Engine Speed Signal.

Crankshaft (bottom) engine timing sensor.

FMI 02 - Erratic, intermittent, or incorrect signal.

FMI 11 - Failure mode is not identifiable (Mechanical Failure).

CORRECTIVE ACTION

STEP 1. Turn the ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch is OFF, DEAD CRANK SWITCH is OFF.

STEP 2. Disconnect connector ENG-P401 from the crankshaft engine timing sensor (FO-2, sheet 1). The sensor connector has a wire clip that must be removed in order to disconnect the connector from the sensor.

STEP 3. Measure engine timing sensor resistance.

a. If resistance is not 75 to 230 ohms, replace crankshaft engine timing sensor (WP 0098).

b. If resistance is correct, inspect and adjust engine timing (WP 0013, SYMPTOM 3).

c. Verify the problem has been resolved. If not, continue to the next step.

STEP 4. If the problem is not resolved, remove and inspect sensor (WP 0013, SYMPTOM 3, steps 6-a thru 6-f)

a. If sensor is damaged, replace and adjust sensor (WP 0098, WP 0013, SYMPTOM 3). Verify the problem is resolved.

b. If the sensor does not appear to be damaged, reinstall sensor.

STEP 5. Disconnect ENG-P2 from the ECM J2 (WP 0088, Figure 2, sheet 3 and FO-2, sheet 1).

STEP 6. Inspect engine harness and verify continuity between ENG-P401-A and ENG-P2-49 and between ENG-P401-B and ENG-P2-48 (FO-2, sheet 1).

a. If open or shorted, repair or replace engine harness (WP 0088), as necessary

b. Verify the problem has been resolved. If not, replace ECM (WP 0082).

STEP 7. Verify the problem has been resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

SYMPTOM

26. CID 248 FMI 09

MALFUNCTION

CAT Data Link.

FMI 09 - Abnormal update.

CORRECTIVE ACTION

STEP 1. Turn the ENGINE CONTROL switch to OFF/RESET. Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF.

STEP 2. Disconnect ENG-P1 from ECM.

STEP 3. Verify continuity between CDC P7-E and ENG P1-9 and between CDC P7-D and ENG P1-8 per FO-4, sheet 1, FO-2, sheet 2 and WP 0088, Figure 2, sheet 3.

a. Repair or replace harness, as required (WP 0088). Verify the problem has been resolved.

b. If the problem is not resolved, continue to STEP 4.

STEP 4. Perform Electronic Service Tool (Cat ET) will not communicate with ECM (WP 0013, SYMPTOM 7).

STEP 5. Verify the problem has been resolved.

NOTE

This code indicates that a customer or system parameter has not been programmed, or the code in the personality module in the ECM does not match the code for the ECM. The engine may be limited in horsepower or speed.

SYMPTOM

27. CID 253 E FMI 02

MALFUNCTION

Personality Module Mismatch.

FMI 02 - Erratic, Intermittent, or Incorrect Signal.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON, Set DEAD CRANK SWITCH to NORMAL. Turn ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. Verify the flash file in the ECM (WP 0013, SYMPTOM 9).

If flash file is incorrect, load correct flash file into the ECM (WP 0013, SYMPTOM 9). Verify the problem has been resolved.

STEP 3. If the problem is not resolved, replace ECM (WP 0082).

Load correct flash file into ECM (WP 0013, SYMPTOM 9).

STEP 4. Verify the problem is resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

NOTE

This fault code indicates that the ECM has detected an internal power supply or memory problem that can not be repaired.

SYMPTOM

28. CID 254 E FMI 12

MALFUNCTION

ECM Self Test.

FMI 12 - Failed Component.

CORRECTIVE ACTION

STEP 1. If the ECM fails Self Test, replace ECM (WP 0082).

STEP 2. Load correct flash file into ECM (WP 0013, SYMPTOM 9).

STEP 3. Verify the ECM passes Self Test.

SYMPTOM

29. CID 261 E FMI 13

MALFUNCTION

Engine Timing Calibration.

FMI 13 - Device is Not Calibrated.

CORRECTIVE ACTION

Perform Engine Timing Calibration (WP 0013, SYMPTOM 8).

TROUBLESHOOTING USING GSC FAULT CODES - Continued

NOTE

These failures are caused by either a failed sensor or a problem with the wiring.

SYMPTOM

30. CID 262 E FMI 03

CID 262 E FMI 04

MALFUNCTION

5 V Sensor Power Supply.

FMI 03 - Voltage Above Normal.

FMI 04 - Voltage Below Normal.

CORRECTIVE ACTION

STEP 1. On EMCP, turn ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch is OFF, DEAD CRANK SWITCH is OFF.

STEP 2. Inspect connectors ENG-P2 on the engine harness (FO-2, sheet 1) and ENG-P1 on the ECM to EMCP Harness (FO-2, sheet 2).

STEP 3. Conduct an appropriate pull test on wires (WP 0088) in the ENG-P2 and ENG-P1 connectors to ensure wires are tight and secure.

STEP 4. Check the wires on both harnesses for abrasion and pinch points (WP 0088).

Repair and/or replace the connectors and/or wiring (WP 0088).

STEP 5. Set Battery Disconnect Switch to ON, Set DEAD CRANK SWITCH to NORMAL. On EMCP, turn ENGINE CONTROL switch to COOL DOWN/STOP

STEP 6. Check for FMI 03 and/or FMI 04 failure modes with associated fault codes CID 94 and CID 100 simultaneously or CID 273, and CID 274 simultaneously..

a. If found, go to STEP 7 and troubleshoot engine wiring harness. Check for opens or shorts in the sensors common wires.

b. If not found, proceed to STEP 8.

STEP 7. Troubleshoot engine wiring harness per WP 0088, Figure FO-2, Sheets 1 and 2.

a. Disconnect engine wiring harness connectors ENG-P1 and ENG-P2 and the connectors to sensors listed in STEP 8.

b. Check continuity between ENG-P1 and ENG-P2 and all sensors identified in STEP 8.

c. If wires all have continuity, reconnect all sensor connectors, ENG-P1 and ENG-P2. Proceed to STEP 8.

d. If continuity is not found, repair or replace wiring harness as necessary per WP 0088.

e. Reconnect all sensors, ENG-P1 and ENG-P2 and verify is the problem still exists. If so, proceed to STEP 8.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

CORRECTIVE ACTION - Continued

STEP 8. Set Battery Disconnect Switch to ON, Set DEAD CRANK SWITCH to NORMAL. Turn ENGINE CONTROL switch to COOL DOWN/STOP. Disconnect the following sensors one at a time, while observing the GSC (WP 0088, Figure 1).

a. Oil pressure sensor.

b. Turbo outlet pressure sensor.

c. Fuel pressure sensor.

d. Atmospheric pressure sensor.

e. Turbo inlet pressure sensor.

STEP 9. On EMCP, turn ENGINE CONTROL switch to OFF/RESET, Battery Disconnect Switch to OFF; and DEAD CRANK SWITCH to OFF.

STEP 10. If the diagnostic code deactivated after a particular sensor was disconnected, replace the sensor causing the fault (WP 0098).

STEP 11. Set Battery Disconnect Switch to ON, Set DEAD CRANK SWITCH to NORMAL. Turn ENGINE CONTROL switch to COOL DOWN/STOP. Verify if problem still exists. If all sensors have been disconnected and fault remains active, go to STEP 12.

STEP 12. Turn the ENGINE CONTROL switch to OFF/RESET. Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF.

STEP 13. If not performed earlier, troubleshoot wiring harness in STEP 7 (a), (b), (d) and (e).

STEP 13. Set Battery Disconnect Switch to ON, Set DEAD CRANK SWITCH to NORMAL. Turn ENGINE CONTROL switch to COOL DOWN/STOP. Check for fault code.

STEP 14. If fault still exist, replace ECM (WP 0082) Verify fault code has cleared.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

SYMPTOM

31. CID 264 E FMI 03

MALFUNCTION

E-Stop Shutdown.

FMI 03 - Voltage Above Normal.

Event Code. Red EMERGENCY STOP indicator on GSC flashes when PUSH TO STOP EMERGENCY STOP pushbutton is pressed on control panel. Engine shuts down and does not start until pushbutton is pulled out and ENGINE CONTROL switch is set to OFF/RESET and back to MANUAL START.

CORRECTIVE ACTION

STEP 1. Determine reason for Emergency Stop situation.

a. Correct emergency stop condition.

b. Reset emergency stop switch to the OFF position.

c. Verify the fault has cleared. If not proceed to the next step.

STEP 2 . Turn the ENGINE CONTROL switch to OFF/RESET. Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF.

STEP 3. Check for an open circuit between the following test points (FO-1, sheet 2; FO-2, sheet 1):

a. GSC A1-13 to PB3-14

b. Terminal 1A on the Emergency Stop switch and Terminal 2A on the Emergency Stop switch.

c. Terminal TB3-14 and Terminal 1A on the Emergency Stop switch.

d. Terminal 2A on the Emergency Stop switch and the Battery Disconnect Switch.

e. Terminal 27 of the ENG-P37 harness connector and Terminal TB3-14.

f. ECM connector ENG-P1-23 and Terminal 27 of the engine harness connector.

STEP 4. If an open circuit is detected between any of the test points, repair the wiring and/or replace damaged components.

STEP 5. Check each connection for corrosion.

STEP 6. Ensure all wires are properly crimped and/or tightened (WP 0088).

STEP 7. Verify the problem has been resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

NOTE

The GSC displays a CID 268 FMI 02 when the setpoint data is invalid or the setpoint data is out of range. After displaying this code, the GSC sets the affected setpoint(s) to the default value(s).

SYMPTOM

32. CID 268 FMI 02

MALFUNCTION

GSC Electronic Control.

FMI 02 - Erratic, Intermittent, or Incorrect Signal.

CORRECTIVE ACTION

STEP 1. Turn the ENGINE CONTROL switch to OFF/RESET. Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF (to reset the GSC).

STEP 2. Set Battery Disconnect Switch to ON, Set DEAD CRANK SWITCH to NORMAL. Turn ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 3. Verify the problem has been resolved. If not, check for other fault codes. Troubleshoot and resolve as required.

STEP 4. Verify all programmable setpoints in the GSC (WP 0083).

STEP 5. If the problem is not resolved, reprogram the GSC setpoints (WP 0083).

STEP 6. If reprogramming the GSC does not resolve the fault, replace the GSC (WP 0041).

STEP 7. Verify the problem has been resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

NOTE

If the sensor power supply is detected to be greater than 8.5 Vdc or less than 7.5 Vdc, this fault code will appear.

SYMPTOM

33. CID 269 FMI 03

CID 269 FMI 04

MALFUNCTION

GSC 8V Sensor Power Supply.

FMI 03 - Voltage Above Normal.

FMI 04 - Voltage Below Normal.

CORRECTIVE ACTION

STEP 1. Turn the ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch is OFF, DEAD CRANK SWITCH is OFF (to reset GSC).

STEP 2. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 3. Observe fault codes on GSC.

a. Disconnect low coolant sensor connector ENG-P16. Using DVM, measure voltage between ENG-P16-A and ENG-P16-B. If voltage is between 7.5 and 8.5 Vdc go to STEP 3 d. If voltage is above 8.5 Vdc or below 7.5 Vdc go to STEP 3 b.

b. Verify wiring on ECM to EMCP harness between GSC P37 and low coolant sensor connector ENG-P16 (WP 0088). Repair as necessary (WP 0088).

c. If wiring harness was repaired, verify the problem has been resolved.

d. Verify all programmable setpoints in the GSC (WP 0083).

e. If fault still appears on GSC, replace the GSC (WP 0041).

STEP 4. Verify the problem has been resolved.

TROUBLESHOOTING USING GSC FAULT CODES – Continued

SYMPTOM

34. CID 273 FMI 03

CID 273 FMI 04

MALFUNCTION

Turbo Outlet Pressure Sensor.

FMI 03 - Voltage Above Normal.

FMI 04 - Voltage Below Normal.

CORRECTIVE ACTION

Troubleshoot turbo outlet pressure sensor using steps in SYMPTOM 12.

SYMPTOM

35. CID 274 FMI 02

MALFUNCTION

Atmospheric Pressure Sensor.

FMI 02 - Erratic, Intermittent, or Incorrect Signal.

CORRECTIVE ACTION

STEP 1. On EMCP, turn ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch is OFF, DEAD CRANK SWITCH is OFF.

STEP 2. Perform Wiggle Test (WP0013, SYMPTOM 1) and verify continuity between ENG-P2 and atmospheric pressure sensor connector ENG-P203 (per FO-2, sheet 1) Repair or replace engine harness wiring (WP 0088), as necessary.

STEP 3. On EMCP, turn ENGINE CONTROL switch to COOL DOWN/STOP. Battery Disconnect switch is ON, DEAD CRANK SWITCH is NORMAL.

STEP 4. Check for an active 02 diagnostic code. If the fault has not been resolved, replace atmospheric pressure sensor (WP 0098).

STEP 5. If replacing sensor does not resolve fault, replace ECM (WP 0082).

STEP 6. Verify the problem has been resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

SYMPTOM

36. CID 274 FMI 03
CID 274 FMI 04

MALFUNCTION

Atmospheric Pressure Sensor.

FMI 03 - Voltage Above Normal.

FMI 04 - Voltage Below Normal.

CORRECTIVE ACTION

Troubleshoot atmospheric pressure sensor using steps in SYMPTOM 12.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

SYMPTOM

37. CID 334 FMI 02
CID 334 FMI 03
CID 334 FMI 04

MALFUNCTION

Cool Down circuit (P7-36).

FMI 02 - Erratic, Intermittent, or Incorrect Signal.

FMI 03 - Voltage Above Normal.

FMI 04 - Voltage Below Normal.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON, Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. Measure voltage between cool down relay (CDR) pin 13 (+) and TB3-1 (-) per FO-4, sheets 2 and 4.

a. If voltage is not approximately 24 Vdc (battery voltage), repair or replace control box harness (WP 0044). Verify the problem has been resolved.

b. If harness is good, replace relay CDR (WP 0042). Verify the problem has been resolved.

c. If harness repair does not resolve fault and CDR is good, check all GSC fuses (FO-4, Sheets 3 and 5). If GSC fuses are ok,.continue to STEP 3.

STEP 3. Turn the ENGINE CONTROL switch to MANUAL START and allow engine to accelerate to operating speed. After 3 minutes, turn ENGINE CONTROL switch to COOL DOWN/STOP..

STEP 4. Measure voltage between cool down relay (CDR) pin 13 (+) and GSC P7-36 (-) for less than 1.0 Vdc, per FO-4, sheets 1, 2, and 4.

STEP 5. If fault still exist, replace GSC (WP 0041). Verify the problem has been resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

NOTE

A fault code is generated if none of the GSC inputs from the ENGINE CONTROL switch are connected to ground, or if more than one input is grounded.

SYMPTOM

38. CID 336 E FMI 02

MALFUNCTION

ENGINE CONTROL switch.

FMI 02 - Erratic, Intermittent, or Incorrect Signal.

CORRECTIVE ACTION

STEP 1. Turn the ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch is OFF, DEAD CRANK SWITCH is OFF.

STEP 2. Inspect the harness between ENGINE CONTROL switch and the GSC per FO-4, sheets 1, 4, and 5. Look for broken and shorted wires. Repair or replace control box harness, as required (WP 0044 and WP 0088).

STEP 3. Verify continuity of ENGINE CONTROL switch in accordance with FO-1, sheet 2.

a. If ENGINE CONTROL switch is defective, replace ENGINE CONTROL switch (WP 0041).

b. If ENGINE CONTROL switch is good, check all GSC fuses (FO-4, Sheets 3 and 5).

c. If GSC fuses are OK, replace GSC (WP 0041).

STEP 4. Verify the problem has been resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

NOTE

The camshaft (top) engine timing sensor functions as the backup timing sensor in the event the crankshaft (bottom) engine timing sensor fails.

SYMPTOM

39. CID 342 E FMI 02

CID 342 E FMI 11

MALFUNCTION

Camshaft (Top) Engine Timing Sensor.

FMI 02 - Erratic, Intermittent, or Incorrect Signal.

FMI 11 - Failure mode is not identifiable (Mechanical Failure).

CORRECTIVE ACTION

STEP 1. Turn the ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch is OFF, DEAD CRANK SWITCH is OFF.

STEP 2. Disconnect engine harness connector ENG-P402 from the camshaft (top) engine timing sensor (WP 0088, Figure 2, sheet 1, and FO-2, sheet 1). The sensor connector has a wire clip that must be removed in order to disconnect the connector from the sensor.

a. Measure engine timing sensor resistance.

b. If resistance is not 600 to 1800 ohms, replace camshaft (top) engine timing sensor (WP 0098).

c. If resistance is correct, inspect and adjust engine timing (WP 0013, SYMPTOM 3.

d. If sensor damaged, replace and/or adjust sensor (WP 0098, WP 0013, SYMPTOM 3).

STEP 3. Disconnect engine harness connector ENG-P2 from ECM J2 (WP 0088, Figure 2, Sheet 3, and FO-2, Sheet 1). Connect ENG-P402 to the camshaft (top) engine timing sensor (WP 0088, Figure 2, sheet 1, and FO-2, sheet 1)

STEP 4. Inspect engine harness and measure continuity between ENG-P2-58 and ENG-P2-59 (WP 0088, Figure 2, sheet 3). Measurement should be approximately the same as in STEP 2 b. If open or shorted, repair or replace engine harness (WP 0088), as necessary.

STEP 5. Verify the problem has been resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

SYMPTOM

40. CID 360 E FMI 01
CID 360 E FMI 02
CID 360 E FMI 03

MALFUNCTION

Low Engine Oil Pressure Warning (Active & Logged).

FMI 01 - Data Is Valid But Data is Below Normal Operating Range.

FMI 02 - Erratic, Intermittent, or Incorrect Signal.

FMI 03 - Voltage Above Normal.

Event Code. Red LOW OIL PRESSURE indicator flashes when oil pressure drops below the programmed low oil pressure setpoints. Engine shuts down and does not start until fault is corrected.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON, Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. Press ALARM CODES on GSC keypad.

STEP 3. Check oil level and perform service per TM 9-6115-730-10.

STEP 4. Verify the fault code has been cleared.

STEP 5. Verify all alarm and fault codes.

a. If CID 100 is active, troubleshoot engine oil pressure sensor per SYMPTOM 15 and SYMPTOM 16.

b. Troubleshoot other alarm and fault codes, as necessary.

STEP 6. Verify all programmable setpoints (WP 0083).

STEP 7. Verify the fault code has been cleared.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

SYMPTOM

41. CID 361 E FMI 01
CID 361 E FMI 02
CID 361 E FMI 03

MALFUNCTION

High engine coolant temperature warning (Active & Logged).

FMI 01 - Data Is Valid But Data is Below Normal Operating Range.

FMI 02 - Erratic, Intermittent, or Incorrect Signal.

FMI 03 - Voltage Above Normal.

Event Code. Red HIGH WATER TEMP indicator on GSC flashes when coolant temperature rises above programmed setpoints.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON, Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. Press ALARM CODES on GSC keypad.

STEP 3. Verify associated alarm and fault code and troubleshoot (WP 0008 and/or WP 0009).

a. If CID 110 is active, troubleshoot per SYMPTOM 17.

b. Troubleshoot all other alarm and fault codes per WP 0008 and WP 0009.

STEP 4. Verify all programmable setpoints (WP 0083).

STEP 5 Open right side engine access door and check coolant level in coolant recovery (overflow) bottle.

STEP 6. If required service coolant per TM 9-6115-730-10.

STEP 7. Inspect coolant system lines and radiator for leaks per PMCS (WP 0016).

STEP 8. Inspect fan and alternator and water pump belt per PMCS (WP 0016 and WP 0075). Check water pump belt tension. Correct if necessary.

STEP 9. If required, replace water pump belt (WP 0075).

STEP 10. Verify the problem has been resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

SYMPTOM

42. CID 362 E FMI 01

CID 362 E FMI 03

MALFUNCTION

Overspeed Warning (Active and Logged).

FMI 01 - Data is Valid But Data is Below Normal Operating Range.

FMI 03 - Voltage Above Normal.

Red ENGINE OVERSPEED indicator flashes when engine speed rises above programmed setpoint for engine overspeed.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON, Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. Press ALARM CODES on GSC keypad.

STEP 3. Check for associated alarm code and fault code and troubleshoot (WP 0008 and/or WP 0009).

a. If CID 190 is active, troubleshoot per SYMPTOM 24.

b. Troubleshoot all alarm and fault codes per WP 0008 and WP 0009.

c. Check programmable setpoint P010 (WP 0085, Table 4).

STEP 4. Correct faults and resume normal generator operations.

SYMPTOM

43. CID 368 E FMI 01

MALFUNCTION

High Inlet Air Temperature Warning (Active and Logged).

FMI 01 - Data is Valid But Data is Below Normal Operating Range.

Event Code. Intake manifold air temperature sensor detected temperature outside of normal operating range. This input affects ignition timing.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON, Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. Press ALARM CODES on GSC keypad.

STEP 3. Check for associated alarm code and fault code and troubleshoot (WP 0008 and/or WP 0009).

a. If CID 172 is active, troubleshoot per SYMPTOM 22.

b. Troubleshoot all alarm and fault codes per WP 0008 and WP 0009.

STEP 4. Correct faults and resume normal generator operations.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

SYMPTOM

44. CID 390 E FMI 01

MALFUNCTION

Fuel Filter Restriction Warning (Active and Logged).

FMI 01 - Data is Valid But Data is Below Normal Operating Range.

Event Code. Indicates that sensor detects a fuel system restriction.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON, Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. Press ALARM CODES on GSC keypad.

STEP 3. Check for associated alarm code and fault code and troubleshoot (WP 0008 and/or WP 0009).

a. If CID 94 is active, troubleshoot per SYMPTOMS 11.

b. Troubleshoot all alarm and fault codes per WP 0008 and WP 0009.

STEP 4. If no fault code, inspect fuel filter and fuel water/separator per PMCS (WP 0016, WP 0061 and WP 0080) and perform service as directed.

SYMPTOM

45. CID 391 E FMI 01

MALFUNCTION

Inlet Air Restriction Warning (Active and Logged).

FMI 01 - Data is Valid But Data is Below Normal Operating Range.

Event Code. Indicates that sensor detects inlet air restriction.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON, Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. Press ALARM CODES on GSC keypad.

STEP 3. Check for associated alarm code and fault code and troubleshoot (WP 0008 and/or WP 0009).

a. If CID 1589 is active, troubleshoot per SYMPTOMS 64 and 65.

b. Troubleshoot all alarm and fault codes per WP 0008 and WP 0009.

STEP 4. If no fault code, inspect air inlets (WP 0071 and WP 0072).

STEP 5. Remove debris or obstructions and perform service as directed.

STEP 6. Verify the problem has been resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

NOTE

When the GSC activates the EGR, K1 is displayed on the GSC lower display.

SYMPTOM

46. CID 441 FMI 12

MALFUNCTION

GSC Engine Governor Relay (EGR) Output.

FMI 12 - Failed Component.

CORRECTIVE ACTION

STEP 1. Turn the ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch is OFF, DEAD CRANK SWITCH is OFF.

STEP 2. Verify that GSC relay module A1-13 is connected to ground A1-28 when the PUSH TO STOP EMERGENCY STOP pushbutton (ESPB) is pulled out per FO-4, sheet 5.

a. Repair or replace control box harness between ESPB and GSC (WP 0044) and (WP 0088), as necessary.

b. If harness is good, replace ESPB (WP 0041).

STEP 3. Verify continuity of wiring between GSC pins A1-13 and A1-14 (RM-13 and RM-14) and the ECM per FO-4, sheets 1 and 5, FO-1, sheet 2.

a. Repair or replace harness between GSC and ECM (WP 0088).

b. Verify harness is good. If so, check all GSC fuses (FO-4, Sheets 3 and 5). If GSC fuses are OK, replace GSC (WP 0041). Verify the problem has been resolved. If not, proceed to the next step.

c. Verify harness is good and GSC is good. If so, replace ECM (WP 0082).

STEP 4. Verify the problem has been resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

SYMPTOM

47. CID 442 FMI 12

MALFUNCTION

GSC Generator Fault Relay (GFR) Output.

FMI 12 - Failed Component.

CORRECTIVE ACTION

STEP 1. Turn the ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch is OFF, DEAD CRANK SWITCH is OFF.

STEP 2. Remove fuse A1F5 from rear of GSC.

STEP 3. Check fuse A1F5.

STEP 4 If fuse is good, reinstall fuse and disconnect RM 22.

STEP 5. Measure resistance between A1-7 and A1-22 on GSC relay module (checking K2 relay).

a. If resistance is not less than 5 ohms, replace K2 relay.

b. If resistance is greater than 5 ohms measured in STEP 5, check all GSC fuses (FO-4, Sheets 3 and 5).

c. If K2 relay and fuses are good, repair or replace wiring harness (WP 0088), as necessary. Verify problem is resolved.

STEP 7. Set Battery Disconnect Switch to ON, Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 8. Push in PUSH TO STOP EMERGENCY STOP pushbutton.

STEP 9. Reconnect wire(s) to GSC A1-22. If problem is not resolved, replace GSC (WP 0041). Verify the problem has been resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

NOTE

An internal set of CTR contacts short between pins A1-1 and A1-2 on the GSC to maintain power at pin A1-2 if ENGINE CONTROL switch were to be placed in COOL DOWN/STOP position with the engine running. When active GSC CTR output will display K3 on GSC lower display.

SYMPTOM

48. CID 443 FMI 12

MALFUNCTION

GSC Crank Termination Relay (CTR) Output.

FMI 12 - Failed Component.

CORRECTIVE ACTION

STEP 1. Check fuse A1F10 on GSC. Replace if necessary.

STEP 2. Verify the problem has been resolved. If not, proceed to the next step.

STEP 3. Check all GSC fuses (FO-4, Sheets 3 and 5). If GSC fuses are ok, replace GSC (WP 0041).

STEP 4. Verify the problem is resolved.

NOTE

When active GSC SMR output displays K4 GSC lower display.

SYMPTOM

49. CID 444 FMI 12

MALFUNCTION

GSC Starter Motor Relay (SMR) Output.

FMI 12 - Failed Component.

CORRECTIVE ACTION

STEP 1. Turn the ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch is OFF, DEAD CRANK SWITCH is OFF.

STEP 2. Remove fuse A1F4 from rear of GSC.

STEP 3. Check fuse A1F4.

a. If fuse is bad, replace fuse A1F4. Verify the problem has been resolved.

b. If fuse is good, repair or replace wiring harness (WP 0088, Table 1 and Table 2, and WP 0044), as necessary.

c. If wiring is good, proceed to the next step.

STEP 4. Disconnect wire(s) from GSC relay module A1-18 (per FO-4, sheet 5).

STEP 5. On relay module, measure resistance between A1-6 and A1-18. Record measured resistance.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

CORRECTIVE ACTION - Continued

STEP 6. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn ENGINE CONTROL switch to MANUAL START.

NOTE

Measurement must be made before the total cycle crank time of 90 seconds (setpoint P017 WP 0083) is exceeded.

STEP 7. Quickly measure resistance between A1-6 and A1-18. If resistance not less than 5 ohms or if resistance not greater than 5,000 ohms, measured in STEP 5, check all GSC fuses (FO-4, Sheets 3 and 5). If GSC fuses are ok, replace GSC (WP 0041).

STEP 8. Turn the ENGINE CONTROL switch to OFF/RESET. Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF.

STEP 9. Reinstall fuse A1F4 and reconnect wire(s) to GSC A1-18.

STEP 10. Verify the problem has been resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

NOTE

When active GSC RR output displays K5 on GSC lower display.

SYMPTOM

50. CID 445 FMI 12

MALFUNCTION

GSC Run Relay (RR) Output.

FMI 12 - Failed Component.

CORRECTIVE ACTION

STEP 1. Turn the ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch is OFF, DEAD CRANK SWITCH is OFF.

STEP 2. Remove fuse A1F6 from rear of GSC.

STEP 3. Check fuse A1F6.

a. If fuse is bad, replace A1F6. Verify the problem has been resolved.

b. If fuse is not bad, repair or replace wiring harness (WP 0088 Table 1 and Table 2 and WP 0044).

c. If wiring is good proceed to the next step.

STEP 4. Disconnect wire(s) from GSC relay module A1-24 per FO-4, sheet 5.

STEP 5. Measure the resistance between relay module A1-8 and A1-24. Resistance should be greater than 5,000 ohms. Record resistance measurement.

STEP 6. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn ENGINE CONTROL switch to MANUAL START.

STEP 7. Measure the resistance between A1-8 and A1-24. If resistance not less than 5 ohms or the resistance was not greater than 5,000 ohms, measured in STEP 5, check all GSC fuses (FO-4, Sheets 3 and 5). If GSC fuses are ok, replace GSC (WP 0041).

STEP 8. Turn the ENGINE CONTROL switch to OFF/RESET. Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF.

STEP 9. Reinstall fuse A1F6 and reconnect wire(s) to GSC A1-24.

STEP 10. Verify the problem has been resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

NOTE

When the GSC activates the FCR, K7 is displayed on GSC lower display. An internal set of FCR contacts short between Relay Module pins A1-1 and A1-2 on the GSC to maintain power at A1-2 if the ECS is placed in COOL DOWN/STOP position with the engine running.

SYMPTOM

51. CID 447 FMI 12

MALFUNCTION

GSC Fuel Control Relay (FCR) Output.

FMI 12 - Failed Component.

CORRECTIVE ACTION

STEP 1. Check fuse A1F10 on GSC. Replace fuse if bad.

STEP 2. Verify the problem has been resolved. If not, proceed to the next step.

STEP 3. Check all GSC fuses (FO-4, Sheets 3 and 5). If GSC fuses are ok, replace GSC (WP 0041).

STEP 4. Verify the problem has been resolved.

NOTE

The programmable spare relays (PSR1 and PSR2) are used for activating customer equipment. PSR1 is normally closed while PSR2 is normally open.

SYMPTOM

52. CID 448 FMI 12

MALFUNCTION

GSC programmable spare relays (PSR1 and PSR2) output.

FMI 12 - Failed Component.

CORRECTIVE ACTION

STEP 1. Turn the ENGINE CONTROL switch to OFF/RESET. Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF.

STEP 2. Remove fuse A1F8 and A1F9 from rear of GSC.

STEP 3. Check fuse A1F8 and A1F9.

a. If fuse is bad, replace A1F8 and/or A1F9. Verify the problem has been resolved.

b. If fuse is not bad, repair or replace wiring harness (WP 0088 Table 1 and Table 2 and WP 0044). Verify the problem has been resolved.

c. If wiring is good, proceed to the next step.

STEP 4. Disconnect wire(s) from GSC relay module (RM) A1-26 per FO-4, sheet 5.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

CORRECTIVE ACTION - Continued

STEP 5. On the GSC relay module, measure resistance between RM-25 and RM-11. Resistance should be greater than 5000 ohms. Measure resistance between RM-26 and RM-10. Resistance should be less than 5 ohms.

STEP 6. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn ENGINE CONTROL switch to MANUAL START.

STEP 7. Measure resistance between RM-25 and RM-11. Resistance should be less than 5 ohms. Measure resistance between RM-26 and RM-10. Resistance should be greater than 5000 ohms.

STEP 8. Turn the ENGINE CONTROL switch to OFF/RESET. Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF.

STEP 9. If any of the measurements fail, replace the GSC (WP 0041).

STEP 10. Reinstall fuse A1F8 and A1F9 and reconnect wire(s) to GSC A1-26.

STEP 11. Verify the problem has been resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

NOTE

The following fault code means the GSC is unable to measure the AC voltage and AC current. The engine remains able to start and run. This diagnostic code will be shown even when ENGINE CONTROL switch is set to OFF/RESET.

SYMPTOM

53. CID 500 FMI 12

MALFUNCTION

GSC.

FMI 12 - Failed Component.

CORRECTIVE ACTION

STEP 1. Check fuses A5F1, A5F2, and A5F3. Replace if bad.

STEP 2. Verify the problem has been resolved.

STEP 3. Verify the wiring on the A5 module (WP 0088).

STEP 4. Verify the problem has been resolved.

STEP 5. Verify connector A5-P1 is not loose or damaged (WP 0088).

STEP 6. Verify the problem has been resolved.

STEP 7. Verify setpoints (WP 0083, Table 8).

STEP 8. Verify the problem has been resolved.

STEP 9. Check all GSC fuses (FO-4, Sheets 3 and 5). If GSC fuses are ok, replace GSC (WP 0041).

STEP 10. Verify the problem has been resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

NOTE

This fault code means the GSC did not control the engine shutdown. The GSC detected that engine speed dropped from rated speed to 0 RPM when the GSC has not called for a shutdown. The GSC has determined that there is no engine speed sensor fault that would explain the engine shutdown. The engine is disabled from running or starting.

SYMPTOM

54. CID 545 FMI 05

CID 545 FMI 06

MALFUNCTION

Ether Control Relay.

FMI 05 - Current is Below Normal or Circuit is Open.

FMI 06 - Current is Above Normal or Circuit is Grounded.

STEP 1. Turn the ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch is OFF, DEAD CRANK SWITCH is OFF.

STEP 2. Inspect/repair engine harness wiring between ether injection assembly connector ENG-P101 and ECM connector J2 per FO-2, sheet 1, as necessary.

STEP 3. If wiring repair does not resolve fault, replace ether injector assembly (WP 0073).

STEP 4. If replacing ether injector assembly does not resolve fault, replace ECM (WP 0082).

STEP 5. Verify the problem has been resolved.

SYMPTOM

55. CID 566 FMI 07

MALFUNCTION

Unexpected Shutdown.

FMI 07 - Improper Mechanical Response.

CORRECTIVE ACTION

STEP 1. Turn the ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch is OFF, DEAD CRANK SWITCH is OFF.

STEP 2. Check fuel level and quality.

a. If fuel tank is empty, fill tank per TM 9-6115-730-10.

b. If fuel quality is suspect, drain and replace fuel.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

CORRECTIVE ACTION - Continued

STEP 3. Inspect fuel filter. If fuel filter is clogged, replace fuel filter (WP 0080).

STEP 4. Inspect air filter. If air filter is clogged, replace air filter (WP 0071).

STEP 5. Check fuses A1F2 and A1F10 (per FO-4, sheet 5). If fuse is bad, replace fuse.

STEP 6. Refer to engine troubleshooting if there is an obvious engine problem. Troubleshooting without Fault Codes (WP 0011).

STEP 7. Verify the problem has been resolved.

NOTE

This fault code means the ECM has stopped responding to the periodic requests for information from the GSC.

SYMPTOM

56. CID 590 FMI 09

MALFUNCTION

Engine Electronic Control Module.

FMI 09 - Abnormal Update.

CORRECTIVE ACTION

STEP 1. Turn the ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch is OFF, DEAD CRANK SWITCH is OFF.

STEP 2. Verify continuity between GSC P7-19 and ECM ENG-P1-8 and between GSC P7-20 and ECM ENG-P1-9 per FO-4, sheet 1 and FO-2, sheet 2.

a. Repair or replace harness, as required (WP 0088).

b. If harness is good, check all GSC fuses (FO-4, Sheets 3 and 5).

c. If GSC fuses are OK, replace GSC (WP 0041).

d. If replacing GSC does not correct fault, replace ECM (WP 0082).

STEP 3. Verify the problem has been resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

NOTE

This fault code means the GSC detected a short to B+ or B- on one of the lines (P7-21 and P7-22) of the CCM data link. The CCM output is not used.

SYMPTOM

57. CID 770 FMI 09

MALFUNCTION

Customer Communication Module (CCM) Data Link.

FMI 09 - Abnormal Update.

CORRECTIVE ACTION

STEP 1. Troubleshoot data link per WP 0013, SYMPTOM 7.

STEP 2. If the problem is not resolved, replace ECM (WP 0082).

STEP 3. Verify the problem has been resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

NOTE

If the Close Breaker output (P7-37) voltage is detected to be above or below normal, this fault code will appear. This fault occurs only in AUTO PARALLEL mode.

SYMPTOM

58. CID 858 FMI 02

CID 858 FMI 03

CID 858 FMI 04

MALFUNCTION

Close Breaker Output.

FMI 02 - Erratic, Intermittent, or Incorrect Signal.

FMI 03 - Voltage Above Normal.

FMI 04 - Voltage Below Normal.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON, Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. In control box, locate wire between SYNC MODE switch (SMS) pin 11 and P7-37 per FO-4 sheet 1 and FO-1 sheet 3.

STEP 3. Disconnect wire from SMS pin 11 and measure voltage at end of wire.

a. If voltage is not 5.2 ±1.0 Vdc, repair or replace control box harness (WP 0044 and WP 0088), as necessary. Verify the problem has been resolved.

b. If the problem has not been resolved, check all GSC fuses (FO-4, Sheets 3 and 5).

c. If GSC fuses are ok, replace GSC (WP 0041).

STEP 4. Verify the problem has been resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

NOTE

This output varies from +5 Vdc to -5 Vdc and is sent to Load Sharing Module A4 to generate the signal sent to the engine controller to set and control the speed of the engine. If the synchronization is disabled, the output will be approximately 0 Vdc.

NOTE

Set two generators in parallel mode per TM 9-6115-730-10. Generator set A will be the test unit (with the fault) and generator set B will be the load unit.

SYMPTOM

59. CID 1038 FMI 02
CID 1038 FMI 03
CID 1038 FMI 04

MALFUNCTION

Speed Adjust 1 Output (P7-27 (+) and P7-28 (-).

FMI 02 - Erratic, Intermittent, or Incorrect Signal.

FMI 03 - Voltage Above Normal.

FMI 04 - Voltage Below Normal.

CORRECTIVE ACTION

STEP 1. Turn the ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF on generator set A. Set SYNC MODE switch to OFF.

STEP 2. Disconnect wire from LSM A4-24 per FO-4, sheet 2, on generator set A.

STEP 3. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP, on generator set A.

STEP 4. Measure the voltage on the end of the wire (A4-24+) with respect to A4-25.

a. If voltage not 0 ± 1 Vdc, repair or replace harness (WP 0044 and WP 0088), as necessary.

b. If harness is good continue to the next step.

STEP 5. On both generator sets, set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to MANUAL START. Set SYNCH switch to SEMI-AUTOMATIC. Close load contactor on generator set B.

STEP 6. Adjust the engine speed so the frequency, on generator set A is 1 Hz higher than what is on the load bus (generator set B).

STEP 7. Allow the voltage to stabilize.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

CORRECTIVE ACTION - Continued

STEP 8. Measure the voltage on the end of the wire (A4-24+) with respect to A4-25.

a. If voltage not -4 Vdc to -6 Vdc, repair or replace harness (WP 0044 and WP 0088), as necessary.

b. If harness is good continue to the next step.

STEP 9. Adjust the engine speed so the frequency is 1 Hz lower than what is on the load bus.

STEP 10. Allow voltage to stabilize.

STEP 11. Measure voltage on the end of the wire (A4-24+) with respect to A4-25.

a. If voltage is not 4 Vdc to 6 Vdc, repair or replace harness (WP 0044).

b. If voltages are good, replace LSM A4 (WP 0042).

c. If harness is good and voltages are bad, check all GSC fuses (FO-4, Sheets 3 and 5).

d. If GSC fuses are ok, replace GSC (WP 0041).

STEP 12. Verify the problem has been resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

NOTE

This failure is displayed when Main Contactor K1 is closed (input is grounded) and one or both of the following are true:

The difference in frequency between the generator and the bus is greater than 0.2 Hz.
The difference in phase between the generator and the bus is greater than 10 degrees.

When the above conditions are true for more than two seconds, the fault will occur. The GSC will then stop the synchronization process until the fault is cleared and corrected.

SYMPTOM

60. CID 1167 FMI 04

MALFUNCTION

K1 Sense Input (P7-25).

FMI 04 - Voltage Below Normal.

CORRECTIVE ACTION

STEP 1. Turn the ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch is OFF, DEAD CRANK SWITCH is OFF.

STEP 2. Disconnect wire at TB3-12 leading to P7-25 per FO-4, sheet 4.

STEP 3. Set Battery Disconnect Switch to ON, Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 4. Measure voltage on end of wire (TB3-12 +) with respect to TB3-1 (-). Record measured voltage

STEP 5. Check A6 BTB fuses (FO-1, Sheet 5). Replace if necessary. Verify wiring for A6 BTB (FO-1, Sheet 5). Repair if necessary (WP 0088).

STEP 6. Turn the ENGINE CONTROL switch to MANUAL START.

STEP 7. Adjust engine speed so the generator frequency is more than 0.2 Hz different (high or low) than what is on the load bus.

STEP 8. Perform the Permissive Paralleling Procedure. TM 9-6115-730-10.

STEP 9. Ensure the Synchroscope is present on the GSC display.

STEP 10. Touch the loose end of the disconnected wire to TB3-1 (Ground).

a. If fault CID 1167 FMI 04 is displayed on the GSC, repair or replace harness (WP 0044 and WP 0088).

b. If fault is not displayed or if voltage measured in STEP 4 was not 9.5 to 11.5 Vdc, check all GSC fuses (FO-4, Sheets 3 and 5).

c. If GSC fuses are ok, replace GSC (WP 0041).

STEP 11. Verify the problem has been resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

NOTE

This input is high when the bus is live. Input status is compared to reading of bus voltage at P7-17 and P7-18. If the status of the voltage measurements is different than the dead bus sense input with regards to presence or absence of bus voltage a fault is announced.

SYMPTOM

61. CID 1168 FMI 03

MALFUNCTION

Dead Bus Sense Input (P7-29).

FMI 03 - Voltage Above Normal.

CORRECTIVE ACTION

STEP 1. On EMCP, set the ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch is OFF, DEAD CRANK SWITCH is OFF.

STEP 2. Disconnect wire from relay DBHI pin 2 per FO-4, sheet 2.

STEP 3. Set Battery Disconnect Switch to ON, Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 4. Measure the voltage on end of the wire (DBHI-2 +) with respect to relay DBLO pin 4 (-).

a. If voltage is not 9.5 to 11.5 Vdc, repair or replace wiring between GSC and DBHI (WP 0044 and WP 0088).

b. If wiring is good, check all GSC fuses (FO-4, Sheets 3 and 5).

c. If GSC fuses are ok, replace GSC (WP 0041).

STEP 5. On EMCP, set the ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch is OFF, DEAD CRANK SWITCH is OFF.

STEP 6. Reconnect wire to relay DBHI-2.

STEP 7. Ensure that load bus is dead.

STEP 8. Disconnect the wire from relay DBHI-10.

STEP 9. Set Battery Disconnect Switch to ON, Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 10. Measure the voltage on relay DBHI-10 (+) with respect to relay DBLO-4 (-).

a. If voltage is not 9.5 to 11.5 Vdc, replace relay DBHI (WP 0042).

b. If DBHI is good, repair or replace harness, as required (WP 0044 and WP 0088).

c. If harness is good, replace relay DBLO (WP 0042).

STEP 11. Verify the problem has been resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

SYMPTOM

62. CID 1169 FMI 02

MALFUNCTION

AC Transformer Box (ATB) Sensor.

FMI 02 - Erratic, Intermittent, or Incorrect Signal.

CORRECTIVE ACTION

STEP 1. Turn the ENGINE CONTROL switch to OFF/RESET. Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF.

STEP 2. Set Battery Disconnect Switch to ON, Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to MANUAL START.

STEP 3. Using the GSC, observe the values of voltages by phase and record.

a. Turn the ENGINE CONTROL switch to OFF/RESET. Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF.

b. Check fuses A5F1 thru A5F3 on ATB A5 and replace, as required (WP 0042). Verify the problem is resolved. If fuses are good, continue to the next step.

c. If voltages were not within 5% of the desired values and within 5% of each other, repair or replace generator harness between GSC and ATB A5 per FO-4, sheet 3 (WP 0088). Verify the problem is resolved. If not proceed to the next step

d. If voltages were not within 5% of the desired values and within 5% of each other, repair or replace generator harness between generator output and ATB A5 per FO-4, sheet 3 and FO-3, sheet 2 (WP 0088). Verify the problem is resolved. If not proceed to the next step.

e. If ATB A5 is good, continue to next step.

STEP 4. Set Battery Disconnect Switch to ON, Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to MANUAL START.

STEP 5. Read Line to N voltages for all three phases on GSC and record

STEP 6. Measure the voltages at TB1 between terminal 10 and terminals 1, 2 & 3, and record.

STEP 7. Measure the voltages between TB1, terminal 10 and A5F1, A5F2, and A5F3. Record voltages.

STEP 8. If voltages do not match, troubleshoot wiring harness (WP 0088) between TB1 and A5. Repair or replace wiring harness as necessary.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

CORRECTIVE ACTION - Continued

STEP 9. Compare voltages between GSC control panel reading and A5. If they match, troubleshoot wiring harness between TB1 and GSC for loose connection, corrosions, and broken wires. Repair and replace, as necessary (WP 0088).

STEP 10. If GSC voltage and A5 voltage do not match, check continuity of wires between A5P1 and GSCP7 (FO-1, sheet 5).

STEP 11. If continuity is present, replace A5 module (WP 0042).

STEP 12. Verify that problem is resolved. If problem still exists, check all GSC fuses (FO-4, Sheets 3 and 5). If GSC fuses are ok, replace GSC (WP 0041).

STEP 13. Verify the problem is resolved.

NOTE

The Bus Transformer Box isolates and reduces the Load Bus voltages for use by the GSC. The GSC uses the reduced value of L1 (Phase A) to determine the voltage level on the load bus. The GSC uses the reduced value of L3 (Phase C) to measure the frequency of the voltage on the load bus.

SYMPTOM

63. CID 1170 FMI 02

CID 1170 FMI 04

CID 1170 FMI 08

MALFUNCTION

Bus Transformer Box (BTB) Sensor.

FMI 02 - Erratic, Intermittent, or Incorrect Signal.

FMI 04 - Voltage Above Normal.

FMI 08 - Voltage Below Normal.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect switch to OFF.

STEP 2. Check BTB A6 fuses A6F1 and A6F2 per FO-4, sheet 3. Replace BTB A6 fuses, as required (WP 0041).

STEP 3. Remove BTB A6 fuses A6F1 and A6F2. Measure resistance between wires B11 and B12 connected to A6 fuse block. Resistance should be 2140 + / - 400 ohms. Record resistance measurement.

STEP 4. If A6 is replaced, verify that problem is resolved.

STEP 5. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to MANUAL START. Set the GSC to display L to L voltage. Adjust voltage to 208 voltage.

STEP 6. Measure and record voltage between A6B21 and A6F1 and between A6B21 and A6F2.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

CORRECTIVE ACTION - Continued

STEP 7. Measure voltage at Load output terminal board, TB2, between terminals L0 (N) and L1 and between L0 (N) and L3. Record voltages.

STEP 8. If voltage is not same as generator output, repair or replace harness between BTB A6 and generator output per FO-4 sheet 3 and FO-3 sheet 2 (WP 0088).

STEP 9. Measure voltage between A6J1-A and A6J1-B per FO-4 sheet 5. Value should be the same as the value in step 4 divided by 15: (208 Vac = 14 Vac) (416 Vac = 28 Vac).

a. If voltage is zero, or resistance measured in STEP 2 was incorrect, replace A6 (WP 0042)

b. If voltage is correct, check continuity between A6P1-A and P7-17 and between A6P1-B to P7-18 (WP 0042).

c. If continuity is not present, repair or replace wiring harness as necessary (WP 0088). Verify that problem has been resolved.

d. If problem is not resolved, check all GSC fuses (FO-4, Sheets 3 and 5).

e. If GSC fuses are ok, replace GSC (WP 0041).

STEP 10. Verify the problem is resolved.

SYMPTOM

64. CID 1589 E FMI 02

MALFUNCTION

Turbo Air Inlet Pressure Sensor.

FMI 02 - Erratic, Intermittent, or Incorrect Signal.

CORRECTIVE ACTION

STEP 1. On EMCP, turn ENGINE CONTROL switch to OFF/RESET. Battery Disconnect switch is OFF, DEAD CRANK SWITCH is OFF.

STEP 2. Inspect wiring and verify continuity between engine harness ENG-P2 and turbo air inlet pressure sensor connector ENG-P15 per FO-2, sheet 1. Repair or replace engine harness wiring (WP 0088).

STEP 3. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 4. Check for an active 02 diagnostic code. If the fault has not been resolved, replace turbo air inlet pressure sensor (WP 0098).

STEP 5. If replacing sensor does not resolve fault, replace ECM (WP 0082).

STEP 6. Verify the problem has been resolved.

TROUBLESHOOTING USING GSC FAULT CODES - Continued

SYMPTOM

65. CID 1589 E FMI 03
CID 1589 E FMI 04

MALFUNCTION

Turbo air inlet pressure sensor.

FMI 03 - Voltage Above Normal.

FMI 04 - Voltage Below Normal.

CORRECTIVE ACTION

Troubleshoot turbo air inlet pressure sensor using steps in SYMPTOM 12.

END OF WORK PACKAGE

FIELD LEVEL TROUBLESHOOTING
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
DVR FAULT CODE TROUBLESHOOTING PROCEDURES

INITIAL SETUP:

Personnel Required	References
One	WP 0083 TM 9-6115-730-10 FO-1 FO-3 FO-4

TROUBLESHOOTING USING DVR FAULT CODES

WARNING

Metal jewelry can conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

Ensure that the engine cannot be started while maintenance is being performed. (ENGINE CONTROL switch set to OFF/RESET. Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF.)

TROUBLESHOOTING USING DVR FAULT CODES - Continued

SYMPTOM

1. Code 0000 No Fault Present

MALFUNCTION

None

CORRECTIVE ACTION

None

SYMPTOM

2. Code 601

MALFUNCTION

Internal Memory Failure

CORRECTIVE ACTION

STEP 1. Set the ENGINE CONTROL switch to OFF/RESET to reset the fault (WP 0006).

STEP 2. Set Battery Disconnect switch to ON. Set DEAD CRANK SWITCH to ON. Set the ENGINE CONTROL Switch to COOL DOWN/STOP.

STEP 3. Check all parameters between :01 and :38 (WP 0083). Verify the problem has been resolved.

a. If fault reoccurs periodically, may be indication of failing battery. Check for related failures and correct. Check for battery error codes on GSC. Codes displaying FMI 04 indicate low voltage. Check batteries (WP 0050).

b. If the problem has not been resolved, check for additional DVR fault codes. Correct any faults. Verify the problem has been resolved.

c. If the problem has not been resolved, memory is failing in Digital Voltage Regulator (DVR). Replace DVR (WP 0042).

STEP 4. Verify the problem is resolved.

TROUBLESHOOTING USING DVR FAULT CODES - Continued

NOTE

The watchdog is a circuit that monitors the computer to be sure it can not go off line. This failure indicates that the computer went off line and was reset by the watchdog circuit. This failure can occur during engine cranking if battery voltage dips too low.

SYMPTOM

3. Code 602

MALFUNCTION

Internal Watchdog Failure

CORRECTIVE ACTION

STEP 1. Measure voltage at B+ and B- terminals on front of DVR while starting generator set.

a. If voltage is less than 18 Vdc, go to STEP 2.

b. If voltage is greater than 18 Vdc, proceed to STEP 8.

STEP 2. Inspect battery connections for corrosion or loose connections per FO-4, sheet 3. Clean and tighten connections.

STEP 3. Inspect battery connections on TB3, terminals 1-10 and TB4, terminals 17-20 for corrosion or loose connections. Clean and tighten connections.

STEP 4. Inspect battery connections B+ and B- on rear of Generator Set Control (GSC) for corrosion or loose connections. Clean and tighten connections.

STEP 5. Inspect battery connections B+ and B- on front of DVR for corrosion and loose connections. Clean and tighten connections.

STEP 6. Measure voltage drop across resistor assembly A7 CB1 per FO-4, sheet 4. If voltage drop is not less than 0.1 Vdc, replace CB1 (WP 0042).

STEP 7. Troubleshoot charging system per alternator does not charge batteries system troubleshooting procedure (WP 0011, SYMPTOM 23).

STEP 8. If the problem is not resolved, replace DVR (WP 0042).

STEP 9. Verify the problem is resolved.

TROUBLESHOOTING USING DVR FAULT CODES - Continued

NOTE

The variation (ripple) of exciter field current exceeds the diode monitor trip point (parameter: 19) for a period of five seconds.

SYMPTOM

4. Code 603

MALFUNCTION

Rotating Diode Defective.

CORRECTIVE ACTION

STEP 1. Check DVR parameter 19 in accordance with WP 0083.

STEP 2. Disconnect wire from DVR A3F1 and check continuity between A3F1 and TB5-2. If continuity does not exist, repair or replace wiring harness as necessary (WP 0088).

STEP 3. Verify that G1F1 is connected to TB5 terminal 2 and G1F2 is connected to TB5 terminal 1.

STEP 4. Disconnect wire from DVR A3 terminal F2. Check continuity between A3F2 and TB1-5 terminal 1. If continuity does not exist, repair or replace wiring harness as necessary (WP 0088).

STEP 5. If continuity exists, replace rotating diodes (WP 0094).

STEP 6. If replacing rotating diodes does not resolve the problem, repair main generator (G1) (WP 0094).

STEP 7. If the problem is not resolved, replace the generator (WP 0095).

TROUBLESHOOTING USING DVR FAULT CODES - Continued

WARNING

Dangerously high voltage can exist across current transformer (CT) output with engine running. CT could explode if disconnected from load with engine running. Do not disconnect CT with generator rotating. Failure to comply can cause serious injury or death to personnel.

NOTE

The DVR detected a 0.4 per unit or greater leading reactive power for a time greater than the value entered in reverse VAR trip time (parameter :20). This fault shuts down the DVR and removes excitation from the field. This function is only active if parameter :21 is set to 2. This function is inactive if parameter :22 is set to 1.

SYMPTOM

5. Code 604

MALFUNCTION

Reverse VAR (Alarm Fault)

CORRECTIVE ACTION

STEP 1. Two connections reversed could cause this fault. Verify current transformer CCCT and voltage inputs from PT2, PT3, and DVR terminals 20, 22, and 24 are connected per FO-3 and FO-4.

STEP 2. Retrieve and verify all DVR parameters (WP 0083). Record :04 (generator rated current) and :05 (current transformer output at rated output current) values.

STEP 3. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to ON. Turn ENGINE CONTROL switch to MANUAL START.

STEP 4. Connect load at 25% to 50% of rated load. Use 0.8 power factor inductive load, if possible.

STEP 5. On GSC measure current in phase B. Record value.

STEP 6. Measure AC voltage between terminals A3-5 and A3-6 of DVR per FO-4, sheet 3. Record value.

a. The voltage measured, divided by the value in parameter :05 should be roughly equal to the measured current divided by parameter :04.

b. If not approximately the same, replace DVR (WP 0042).

STEP 7. Fault code could have been caused by a fault of the load.

a. If problem recurs and fault can not be traced to load, replace DVR (WP 0042).

b. If the problem is not resolved, refer to generator repair (WP 0094) or generator replacement (WP 0095).

STEP 8. Verify the problem is resolved.

TROUBLESHOOTING USING DVR FAULT CODES - Continued

NOTE

The DVR detected that the generator voltage has been less than the undervoltage trip point (parameter :13) for more than the amount of time specified by the undervoltage trip time (parameter :14). This alarm is disabled during the start-up profile.

SYMPTOM

6. Code 701

MALFUNCTION

Undervoltage.

CORRECTIVE ACTION

STEP 1. Adjust VOLTAGE Adjust Potentiometer on control panel clockwise to increase voltage.

STEP 2. If paralleled to other generator sets, check VOLTAGE adjust setting on each set.

STEP 3. Start generator set and verify that problem has been resolved.

STEP 4. If problem is not resolved, perform Voltage Adjust Potentiometer test (WP 0041).

STEP 5. Measure battery voltage at B+ and B- terminals on DVR per FO-4, sheet 3. Voltage should be 18 to 32 Vdc.

STEP 6. Verify that correct DVR parameters are entered (WP 0083) and that parameters match the reconnection board position (WP 0014). Enter proper parameters (WP 0083). Verify parameters after entry.

STEP 7. With generator set running, measure AC voltage between pins A3-26 and A3-28, A3-28 and A3-30, and A3-26 and A3-30 per FO-4, sheet 3.

STEP 8. If voltages are not between 95 to 120 Vac at all three locations, shut down generator set.

STEP 9. Check fuses F1-10A, F2-10A, F3-10A and replace defective fuses.

a. Open fuse holder F1, F2, and F3.

b. Check resistance, F1-1 to F2-1, F2-1 to F3-1, and F3-1 to F1-1. Resistance should be less than 1 ohm. If open or above 1 ohm, troubleshoot wires between F12, F2, and F3 to TB1 and alternator.

c. Check resistance, F1-2 to F2-2, F2-2 to F3-2, and F3-2 to F1-1. Resistance should be between 0.2 to 0.4 ohms. If open or above 0.4 ohms, troubleshoot wires between F12, F2, and F3 and transformer PT2 and PT3, and transformer primary winding, PT2, PT3 before removing wires from A3-26, A3-28, and A3-30.

STEP 10. Check resistance, A3-26 to a3-28; A3-28 to A3-30, and A3-30 to A3-26. Resistance should be between 0.2 and 2.0 ohms. If open or above 2 ohms, troubleshoot secondary winding of PT2 and PT3 and wires between A3-26, A3-28 and A3-30 to PT2 and PT3.

STEP 11. Measure AC voltage between pins A3-20 and A3-22, A3-22 and A3-24, and A3-20 and A3-24.

TROUBLESHOOTING USING DVR FAULT CODES - Continued

CORRECTIVE ACTION - Continued

STEP 12. Voltages should be the same and at the proper ratio to the output voltage in accordance with parameter :02.

STEP 13. If the problem is not resolved, replace DVR (WP 0042).

STEP 14. Verify the problem is resolved.

STEP 15. If the problem is not resolved, repair or replace generator (WP 0094 or WP 0095).

TROUBLESHOOTING USING DVR FAULT CODES - Continued

NOTE

The DVR detected that the generator voltage has been more than the overvoltage trip point (parameter :11) for more than the amount of time specified by the overvoltage trip time (parameter :12).

SYMPTOM

7. Code 702

MALFUNCTION

Overvoltage.

CORRECTIVE ACTION

STEP 1. Adjust VOLTAGE adjust potentiometer on control panel counterclockwise to reduce voltage.

STEP 2. If paralleled to other generator sets, check voltage setting on other sets.

STEP 3. Start generator set and verify that problem has been resolved.

STEP 4. If problem not resolved, perform VOLTAGE Adjust Potentiometer test (WP 0041).

STEP 5. Verify that correct parameters are entered in DVR and that parameters match the reconnection board position (WP 0083).

STEP 6. Enter proper parameters (WP 0083). Verify parameters after entry.

STEP 7. With generator set running, measure AC voltage between pins A3-26 and A3-28, A3-28 and A3-30, and A3-26 and A3-30 per FO-4, sheet 3.

STEP 8. If voltages not 95 to 120 Vac at all three locations, shut down generator set.

STEP 9. Check fuses F1-10A, F2-10A, F3-10A and replace defective fuses.

a. Open fuse holder F1, F2, and F3.

b. Check resistance, F1-1 to F2-1, F2-1 to F3-1, and F3-1 to F1-1. Resistance should be less than 1 ohm. If open or above 1 ohm, troubleshoot wires between F12, F2, and F3 to TB1 and alternator.

c. Check resistance, F1-2 to F2-2, F2-2 to F3-2, and F3-2 to F1-1. Resistance should be between 0.2 to 0.4 ohms. If open or above 0.4 ohms, troubleshoot wires between F12, F2, and F3 and transformer PT2 and PT3, and transformer primary winding, PT2, PT3 before removing wires from A3-26, A3-28, and A3-30.

STEP 10. Check resistance, A3-26 to a3-28; A3-28 to A3-30, and A3-30 to A3-26. Resistance should be between 0.2 and 2.0 ohms. If open or above 2 ohms, troubleshoot secondary winding of PT2 and PT3 and wires between A3-26, A3-28 and A3-30 to PT2 and PT3.

STEP 11. Measure AC voltage between pins A3-20 and A3-22, A3-22 and A3-24, and A3-20 and A3-24.

STEP 12. Voltages should be the same and at the proper ratio to the output voltage in accordance with parameter :02.

STEP 13. If the problem is not resolved, replace DVR (WP 0042).

STEP 14. If the problem is not resolved, repair or replace generator (WP 0094 or WP 0095).

TROUBLESHOOTING USING DVR FAULT CODES - Continued

SYMPTOM

8. Code 703

MALFUNCTION

Overexcitation

CORRECTIVE ACTION

STEP 1. If operating in parallel, re-parallel the generator sets in accordance with TM 9-6115-730-10.

STEP 2. Start generator set and verify that problem has been resolved with no load.

STEP 3. If the problem does not exist with no load, verify that generator set is not overloaded. Reduce load below rated generator set load.

STEP 4. Inspect wiring between TB1 and terminals A3-20, A3-22, and A3-24 of DVR per FO-3 and FO-4.

STEP 5. Repair or replace wiring (WP 0088).

STEP 6. Check DVR A3 parameters (WP 0083).

STEP 7. If the problem exists with no load, replace DVR (WP 0042).

STEP 8. Repair or replace as required (WP 0094 or WP 0095).

STEP 9. Verify the problem is resolved.

TROUBLESHOOTING USING DVR FAULT CODES - Continued

WARNING

Dangerously high voltage can exist across current transformer (CT) output with engine running. CT could explode if disconnected from load with engine running. Do not disconnect CT with generator rotating. Failure to comply can cause serious injury or death to personnel.

NOTE

The DVR detected a 0.4 per unit or greater leading reactive power for a time greater than the value entered in reverse VAR trip time (parameter :20). This fault shuts down the DVR and removes excitation from the field. This function is only active if parameter :21 is set to 2. This function is inactive if parameter :22 is set to 1.

SYMPTOM

9. Code 704

MALFUNCTION

Reverse VAR (Shutdown Fault)

CORRECTIVE ACTION

STEP 1. Verify current transformer CCCT and voltage inputs from PT2, PT3, and DVR terminals 20, 22, and 24 are connected per FO-3 and FO-4.

STEP 2. Two connections reversed could cause this fault. Connect per schematic and wiring diagram FO-4.

STEP 3. Retrieve and verify all DVR parameters (WP 0083). Record :04 (generator rated current) and :05 (current transformer output at rated output current) values.

STEP 4. On EMCP set ENGINE CONTROL switch to MANUAL START.

STEP 5. Connect load at 25% to 50% of rated load. Use 0.8 power factor inductive load, if possible.

STEP 6. On GSC measure current in phase B. Record value.

STEP 7. Measure AC voltage between terminals A3-5 and A3-6 of DVR per FO-4, sheet 3. Record value.

a. The voltage measured, divided by the value in parameter :05 should be roughly equal to the measured current divided by parameter :04.

b. If not approximately the same, proceed to next step.

STEP 8. Fault code could have been caused by a fault of the load.

a. If problem recurs and fault can not be traced to load, replace DVR (WP 0042).

b. If the problem is not resolved, refer to generator repair (WP 0094) or replacement (WP 0095).

STEP 9. Verify the problem is resolved.

TROUBLESHOOTING USING DVR FAULT CODES - Continued

NOTE

The DVR detected that the exciter field current was greater than approximately 28 Amps. The DVR shut off the exciter field current.

SYMPTOM

10. Code 801

MALFUNCTION

Instantaneous Trip

CORRECTIVE ACTION

STEP 1. On keypad, press ALARM CODES and check GSC related codes. Resolve as required.

STEP 2. Disconnect wire from DVR, A3, and Terminal F2. Measure resistance between disconnected wire and F1.

a. If resistance is less than 4 ohms, troubleshoot exciter circuit between F1, F2, and exciter windings (WP 0088). Repair or replace wiring harness as necessary.

b. Repair or replace Generator G1 as necessary (WP 0094 or WP 0095).

c. If resistance is 4 ohms or greater, replace DVR (WP 0042).

STEP 3. Verify the problem is resolved.

NOTE

The DVR detects that one of the sense inputs is open or shorted to another input.

SYMPTOM

11. Code 802

MALFUNCTION

Loss of Sensing

CORRECTIVE ACTION

STEP 1. Inspect wiring and verify continuity between TB1 and terminals A3-20, A3-22, and A3-24 of DVR per FO-3 and FO-4.

a. Repair or replace wiring (WP 0044 and WP 0088) as necessary.

b. If the problem is not resolved, replace the DVR (WP 0042).

STEP 2. Verify the problem is resolved.

TROUBLESHOOTING USING FAULT CODES - Continued

NOTE

The DVR detects that there is no AC frequency present for 200 ms while the measured voltage is greater than 50% of nominal.

SYMPTOM

12. Code 803

MALFUNCTION

Loss of Frequency

CORRECTIVE ACTION

STEP 1. Check fuses F1, F2, or F3 per FO-1, sheet 4 and FO-3, sheet 1.

STEP 2. Replace fuses F1, F2, or F3, as required (WP 0055).

STEP 3. Troubleshoot wiring harness.

a. Check and repair wiring between PT2, PT3 and DVR, as required (WP 0088).

b. Check and repair wiring between PT2, PT3, and fuses F1, F2, and F3, as required (WP 0088).

c. Check and repair wiring between fuses (F1, F2, and F3) and generator, as required (WP 0088).

d. Remove fuses F1, F2, and F3. Measure resistance between F1 terminal 2 and F2 terminal 2. If not 0.3 +/- 0.1 ohms, replace transformer PT2 (WP 0053).

e. Measure resistance between F2 terminal 2 and F3 terminal 2. If not 0.3 +/- 0.1 ohms, replace transformer PT3 (WP 0053).

f. Measure resistance between F3 terminal 2 and F1 terminal 2. If not 0.6 +/- 0.1 ohms, check all connections on transformers (WP 0053).

g. Measure resistance between J31-5 and J31-6. If not 0.3 +/- 0.1 ohms, replace PT2 (WP 0053).

h. Measure resistance between J31-6 and J31-7. If not 0.3 +/- 0.1 ohms, replace PT3 (WP 0053).

i. On EMCP, set Engine Control Switch to OFF/RESET to clear bus fault.

STEP 4. Install fuses F1, F2, and F3 (WP 0055).

STEP 5. Start generator set and measure AC voltage between pins A3-26 and A3-28, A3-28 and A3-30, and A3-26 and A3-30. Verify 95 to 120 Vac present at all three locations.

STEP 6. If voltages not present, repair or replace generator (WP 0094 or WP 0095).

TROUBLESHOOTING USING FAULT CODES - Continued

CORRECTIVE ACTION - Continued

STEP 7. Measure AC voltage between pins A3-20 and A3-22, A3-22 and A3-24, and A3-20 and A3-24. Verify 190 to 240 Vac present at all three locations.

a. Repair wiring between DVR and generator, as required (WP 0044 and WP 0088).

b. If the problem is not resolved, replace the DVR (WP 0042).

STEP 8. Verify the problem is resolved.

SYMPTOM

13. Code 901

MALFUNCTION

DVR Memory Failure (Severe Fault)

CORRECTIVE ACTION

STEP 1. Try to change and store a new parameter value in the DVR (WP 0083).

STEP 2. If code 901 is still present, replace the DVR (WP 0042).

STEP 3. Verify the problem is resolved.

END OF WORK PACKAGE

UNIT (FIELD) LEVEL TROUBLESHOOTING
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
FAILURES WITHOUT A FAULT CODE TROUBLESHOOTING PROCEDURES

INITIAL SETUP:

Tools and Special Tools

Connector/Adapter 3Y-2888
Engine Pressure Group IU-5470
Multimeter 146-4080
O-Ring Seal 3J-1907
Temperature Adapter 6V-9130
Multimeter 146-4080

Personnel Required

One

References

WP 0083
TM 9-6115-730-10

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES

WARNING

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

SYMPTOM

1. Starting Motor Remains Engaged.

MALFUNCTION

Setpoints Incorrect.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. Carefully disconnect one of the push on terminal connectors from the starter motor magnetic switch (SMMS) relay (Figure 1).

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

CORRECTIVE ACTION - Continued

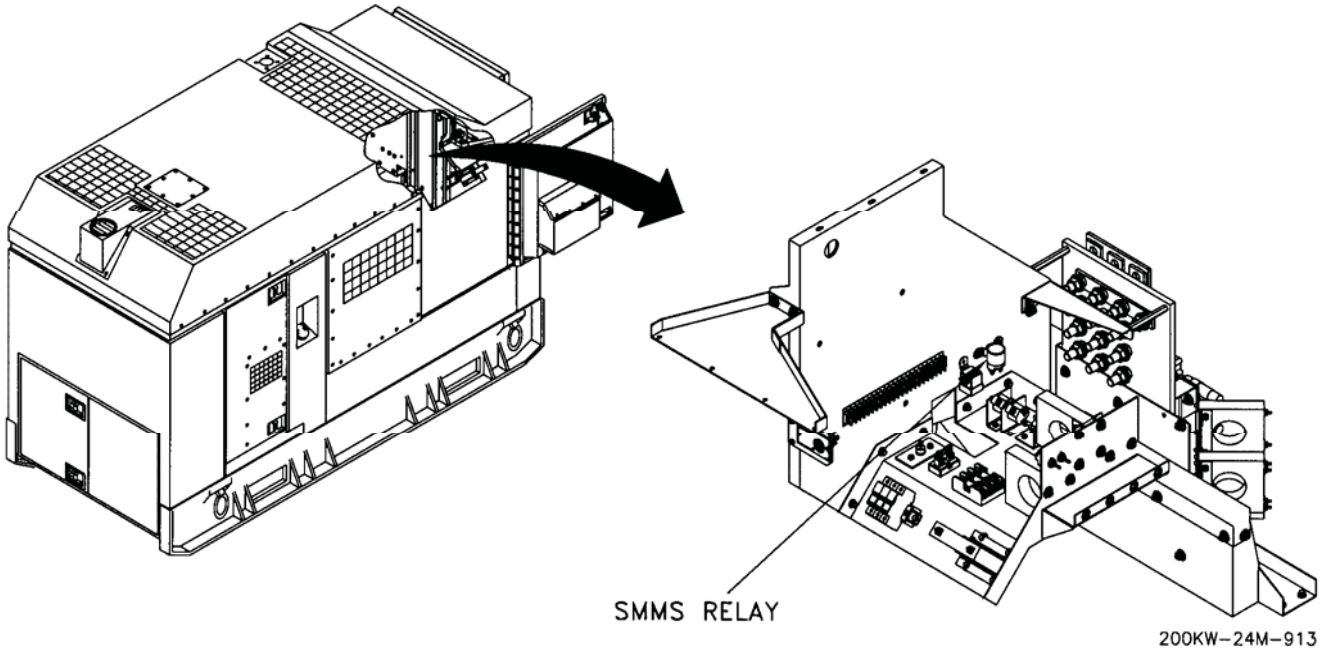

Figure 1. SMMS Relay Location

STEP 3. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn ENGINE CONTROL Switch to COOL DOWN/STOP.

STEP 4. If engine cranks, replace SMMS (WP 0055).

STEP 5. If engine does not crank, view and note value of setpoints P011 (Crank terminate speed), P017 (Total cycle crank time), and P018 (Cycle crank time) refer to WP 0083).

STEP 6. Compare setpoints and reprogram, as required (WP 0083).

STEP 7. Verify the problem has been resolved.

MALFUNCTION

Starting Motor Control Circuitry Malfunction (Engine Will Not Crank).

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to CRANK.

STEP 2. If engine cranks, proceed to STEP 17.

STEP 3. If engine does not crank, check for 24 Vdc at each terminal of CB-2 and ground.

STEP 4. If voltages are not present, replace CB-2.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

CORRECTIVE ACTION - Continued

STEP 5. Check for 24 Vdc at each terminal of R4 Shunt and ground.

STEP 6. If voltages are not present, replace R4 Shunt.

STEP 7. Check for 24 Vdc at each terminal of diode D1 and ground.

STEP 8. If voltages are not present, replace diode D1.

STEP 9. With DEAD CRANK SWITCH in CRANK position, check for 24 Vdc at terminal 3 of the starter motor magnetic switch (SMMS) relay and ground.

STEP 10. If voltage present, check for ground at terminal 4 of the SMMS relay.

STEP 11. If voltage is not present, check for 24 Vdc at TB5-5 and ground.

STEP 12. If voltage present, check wiring or replace Battery Disconnect Switch (WP 0049).

STEP 13. If voltage is not present, check wiring or replace DEAD CRANK SWITCH (WP 0055).

STEP 14. Check for 24 Vdc at pinion solenoid terminals 23A10 (+) wire and black jumper wire (-).

NOTE

It may be necessary to remove cover from pinion solenoid to access solenoid terminals.

STEP 15. If voltage is not present, check wiring or replace SMMS relay (WP 0055).

STEP 16. If voltage is present, check cable at starter or replace starter (WP 0076).

NOTE

When completing CID 444 FMI 12 (WP 0009) do not reinstall fuse A1F4.

STEP 17. On EMCP set ENGINE CONTROL Switch to MANUAL START. If engine does not crank, go to Generator Set Control (GSC) fault isolation for CID 444 FMI 12 (WP 0009).

STEP 18. Set ENGINE CONTROL Switch to MANUAL START observing the following conditions:

a. Engine crank indicator K4 will appear on lower display of GSC for the time duration (in seconds) described by setpoint P017.
b. Engine crank indicator K4 will extinguish for the same duration.
c. Engine crank indicator K4 will appear again for the P017 duration.
d. Cycle will cease when time exceeds P018 duration (in seconds).

STEP 19. If engine crank indicator K4 does not appear and extinguish properly, replace GSC (WP 0041).

STEP 20. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

SYMPTOM

2. Engine Does Not Shut Down When A Shutdown Fault Occurs or Engine Shuts Down with No GSC Fault Codes.

MALFUNCTION

Setpoint Programming Error.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn ENGINE CONTROL Switch to COOL DOWN/STOP.

STEP 2. View and record value of all GSC setpoints. If setpoints viewed do not agree with programmed data, reprogram setpoints (WP 0083).

STEP 3. Verify the problem has been resolved.

MALFUNCTION

Unresolved Diagnostic Codes.

CORRECTIVE ACTION

Check for active diagnostic codes and correct malfunctions as required per WP 0008 and WP 0009.

MALFUNCTION

GSC Relay Module Malfunction.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. Check if the yellow fault alarm indicator is on continuously. This alarm indicates that the GSC has been programmed to override the normal shutdown signal. Reprogram the setpoints that could override the shutdown signal (WP 0083).

STEP 3. Check if the red fault shutdown indicator is flashing. If this alarm indicator is off, the GSC has been programmed to override the normal shutdown signal. Reprogram the setpoints that could override the shutdown signal (WP 0083).

STEP 4. Check that the K1 symbol is displayed on the GSC display. If the K1 symbol is present, repeat this entire procedure to verify fault, replace GSC (WP 0041).

STEP 5. With engine running, remove wire from GSC relay module (RM) A1-13 (FO-4, sheet 5).

STEP 6. If engine does not stop running, shut down system by other means.
a. On EMCP press the PRESS TO STOP EMERGENCY STOP pushbutton.
b. Set DEAD CRANK SWITCH to OFF.
c. Set Battery Disconnect Switch to OFF.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

CORRECTIVE ACTION - Continued

STEP 7. Verify continuity of harness between GSC A1-13 and engine control module (ECM) ENG-P1-23 and A1-14 and ECM ENG-P1-40 (FO-2, sheet 2).
a. Repair or replace harness as required (WP 0044 and WP 0088).
b. If harness is good, replace ECM (WP 0082).

STEP 8. Verify the problem has been resolved.

NOTE

GSC fault shutdown indicator flashes at four to five times per second. GSC displays may not be responding. GSC does not respond to any position of the ECS. This is an internal fault of the GSC which may be temporary or permanent. This condition may also be caused by severe electromagnetic fields or radio frequency interference (RFI).

SYMPTOM

3. GSC Operation Is Erratic.

MALFUNCTION

Red Fault Shutdown Indicator Flashing.

CORRECTIVE ACTION

STEP 1. With the engine running, on EMCP set ENGINE CONTROL switch to OFF/RESET.
a. If GSC does not power down, set DEAD CRANK SWITCH to OFF, then back to NORMAL.
b. If GSC does not power down, press EMERGENCY STOP button. Set the Battery Disconnect Switch to OFF and the DEAD CRANK SWITCH to OFF.

STEP 2. Replace GSC (WP 0041).

STEP 3. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 4. If GSC powers up normally, verify all programmed parameters (WP 0083) and retry system.

STEP 5. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

NOTE

Zero volts or zero amperes is showing on the GSC display for one or more AC phases while the generator set is running and the load is connected. Separate fault isolation is provided for zero voltage and zero current readings.

SYMPTOM

4. Display Of Voltage on GSC is Zero For One or More Phases.

MALFUNCTION

GSC Malfunction.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Check fuses A5F1, A5F2, and A5F3 on AC transformer box (ATB) A5 (FO-4, sheet 3). Replace fuses, as required (WP 0042).

STEP 3. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to MANUAL START. Do not connect a load.

NOTE

Voltage should correspond with reconfiguration board settings line-to-line.

STEP 4. Measure the line-to-line voltage between the fuses on ATB A5. If voltages are not correct, repair or replace wiring between generator and ATB A5 (WP 0044 and WP 0088).

STEP 5. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 6. Disconnect P7 from rear of GSC (FO-4, sheet 1.
a. Measure resistance between P7-16 and P7-10. If resistance is not 6 to 8 ohms, replace ATB A5 (WP 0042).
b. Measure resistance between P7-16 and P7-11. If resistance is not 6 to 8 ohms, replace ATB A5 (WP 0042).
c. Measure resistance between P7-16 and P7-12. If resistance is not 6 to 8 ohms, replace ATB A5 (WP 0042).

STEP 7. Reconnect P7 to rear of GSC (FO-4, sheet 1).

STEP 8. Remove A5F1, A5F2 and A5F3 fuses from ATB A5.
a. Measure resistance between A5F1 and A5F2 on A5 side. If resistance is not 2150 +/- 100 ohms, replace ATB A5 (WP 0042).
b. Measure resistance between A5F2 and A5F3 on A5 side. If resistance is not 2150 +/- 100 ohms, replace ATB A5 (WP 0042).
c. Measure resistance between A5F1 and A5F3 on A5 side. If resistance is not 2150 +/- 100 ohms, replace ATB A5 (WP 0042).

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

CORRECTIVE ACTION - Continued

STEP 9. If ATB A5 is good, replace GSC (WP 0041).

STEP 10. Verify the problem has been resolved.

SYMPTOM

5. Display of Current on GSC is Zero For One or More Phases.

MALFUNCTION

GSC Malfunction.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Tag and disconnect wire 151B16 from ATB A5 terminal TBC-51 (leave wire disconnected until finished troubleshooting) (FO-4, sheet 3).

STEP 3. Measure resistance between end of wire and terminal TBC-50. If resistance is not 4 to 6 ohms, replace ATB A5 (WP 0042).

STEP 4. Tag and disconnect wire from terminal TBC-52.

STEP 5. Measure resistance between end of wire and terminal TBC-50. If resistance is not 4 to 6 ohms, replace ATB A5 (WP 0042).

STEP 6. Tag and disconnect wire from terminal TBC-53.

STEP 7. Measure resistance between end of wire and terminal TBC-50. If resistance is not 4 to 6 ohms, replace ATB A5 (WP 0042).

STEP 8. Measure resistance between ATB A5 terminals TBC-51 and TBC-50. If resistance is not less than 1 ohm, replace ATB A5 (WP 0042).

STEP 9. Measure resistance between ATB A5 terminals TBC-52 and TBC-50. If resistance is not less than 1 ohm, replace ATB A5 (WP 0042).

STEP 10. Measure resistance between ATB A5 terminals TBC-53 and TBC-50.
a. If resistance not less than 1 ohm, replace ATB A5 (WP 0042).
b. If ATB A5 is good, replace GSC (WP 0041).

STEP 11. Disconnect P7 from rear of GSC (FO-4, sheet 1).

STEP 12. Measure resistance between pins P7-4 and P7-16.
a. If resistance is not 100 to 140 ohms, repair or replace wiring (WP 0044).
b. If wiring is good, replace ATB A5 (WP 0042).

STEP 13. Measure resistance between pins P7-5 and P7-16.
a. If resistance not 100 to 140 ohms, repair or replace wiring (WP 0044).
b. If wiring is good, replace ATB A5 (WP 0042).

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

CORRECTIVE ACTION - Continued

STEP 14. Measure resistance between pins P7-6 and P7-16.
a. If resistance not 100 to 140 ohms, repair or replace wiring (WP 0044).
b. If wiring is good, replace ATB A5 (WP 0042).

STEP 15. Verify the problem has been resolved.

SYMPTOM

6. Display of Voltage on GSC is Inaccurate.

MALFUNCTION

Setpoint Incorrect.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. View and record value of setpoint P020. If value does not agree with programmed setpoint, reprogram GSC (WP 0083).

STEP 3. View and record value of setpoints in OP8 (WP 0083).

STEP 4. Open EMCP and record value of bar code setpoints located on AC transformer box A5.
a. If OP8 values do not agree with bar code setpoints marked on ATB A5, reprogram GSC (WP 0083).
b. If setpoints agree, on EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OF. Set DEAD CRANK SWITCH to OFF.
c. Replace GSC (WP 0041).

STEP 5. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 6. View and record value of setpoints in OP10.
a. If value does not agree with programmed setpoint, reprogram GSC (WP 0083).
b. Retest the system.

STEP 7. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

SYMPTOM

7. Display of Current on GSC is Inaccurate.

MALFUNCTION

Setpoint Incorrect.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. View and record value of setpoint P021. If value does not agree with programmed setpoint, reprogram GSC (WP 0083).

STEP 3. View and record value of setpoints in OP8 (WP 0083).

STEP 4 Open EMCP and record value of bar code setpoints located on ATB A5.
a. If values of OP8 setpoints do not agree with bar code setpoints marked on ATB A5, reprogram GSC (WP 0083).
b. If setpoints agree, on EMCP set ENGINE CONTROL Switch to OFF/RESET. Set Battery Disconnect Switch to OF. Set DEAD CRANK SWITCH to OFF.
c. Replace GSC (WP 0041).

STEP 5. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 6. View and record value of setpoints in OP8.
a. If value does not agree with programmed setpoint, reprogram GSC (WP 0083).
b. Retest the system.

STEP 7. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

SYMPTOM

8. Display of Power on GSC is Inaccurate.

MALFUNCTION

Setpoint Incorrect.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. Verify setpoints per WP 0083. If voltage and current readings are accurate, power will be accurate unless the polarity of one or more of the current transformers is incorrect. Carefully check all connections (FO-3, sheet 2).

STEP 3. If connections are correct, on EMCP set ENGINE CONTROL Switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 4. Replace GSC (WP 0041).

STEP 5. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 6. Retest the system.

STEP 7. Verify the problem has been resolved.

WARNING

High voltages may be present at the generator terminals when the unit is rotating. Tools, equipment, clothing, and your body must be kept clear of rotating parts and electrical connections. Special precautions must be taken during troubleshooting since protective covers and safety devices may be removed or disabled to gain access and perform tests. Be careful. Serious injury or death can result from these hazards.

SYMPTOM

9. Generator Produces No Voltage or Voltage Builds Up Then Drops to Zero.

MALFUNCTION

DVR Malfunction.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Check fuse A1F4 and replace as required.

STEP 3. Connect DC voltmeter to relay field flash (KFF), pins 8(+) and 5(-) (FO-4, sheet 2).

STEP 4. Set DEAD CRANK SWITCH to NORMAL and ENGINE CONTROL switch to MANUAL START. Engine should crank.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

CORRECTIVE ACTION - Continued

STEP 5. If 24 Vdc battery voltage is not indicated on voltmeter, check DC voltage between relay KFF-14 (+) and 13 (-).
a. If 24 Vdc is present, replace relay KFF (WP 0042).
b. If 24 Vdc is not present, check for 24 Vdc at GSC RM-18 (+) and ground with ENGINE CONTROL switch set to MANUAL START.
(1) If 24 Vdc is present, repair wiring between RM-18 and relay KFF-14.
(2) If 24 Vdc is not present, replace GSC (WP 0041).

STEP 6. Set ENGINE CONTROL switch to OFF/RESET.

STEP 7. Connect DC voltmeter to digital voltage regulator (DVR) pins A3-F1 (+) and A3-F2 (-) (FO-4, sheet 3).

STEP 8. Set ENGINE CONTROL switch to MANUAL START. Engine should crank.
a. If 9 to 16 Vdc is not indicated on voltmeter, replace diode CRFF (WP 0042).
b. If diode is good, replace 15 ohm 25W resistor on resistor assembly A7 (WP 0043).

STEP 9. Allow engine to start and verify generator is rotating at or near proper speed.

STEP 10. Measure DC generator excitation voltage at DVR pins A3-F1 (+) and A3-F2 (-).
a. If voltage is less than 9 Vdc, replace DVR (WP 0042).
b. If voltage is greater than 15 Vdc, replace generator (WP 0083).

STEP 11. Verify the problem has been resolved.

SYMPTOM

10. Generator Produces Low Voltage Under No Load Condition.

MALFUNCTION

DVR Malfunction.

CORRECTIVE ACTION

STEP 1. Check for DVR fault codes.
a. If DVR fault codes are present, troubleshoot DVR (WP 0010).
b. If DVR fault codes are not present, proceed to STEP 2.

STEP 2. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL Switch to MANUAL START.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

CORRECTIVE ACTION - Continued

STEP 3. Check generator output at load connection board with a voltmeter.
a. If output is not the same as programmed value, reprogram DVR (WP 0083).
b. If reprogramming does not hold, on EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.
c. Replace DVR (WP 0042).

STEP 4. Inspect all generator connections for corrosion or loose connections. Clean and repair connections, as required.

STEP 5. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to MANUAL START.

STEP 6. Measure voltage at DVR B+ and B- terminals (FO-4, sheet 3).
a. If voltage not 18 to 32 Vdc, check power wiring between DVR and GSC. Repair or replace as required (WP 0044).
b. Refer to troubleshooting procedures for GSC CID 168 E FMI 04 (WP 0009).

STEP 7. Check parameters programmed into DVR.
a. If parameters are not correct, reprogram DVR (WP 0083).
b. If the problem is not resolved, replace generator (WP 0095).

STEP 8. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to MANUAL START.

STEP 9. Check engine speed using GSC or tachometer. RPM should be: 1800 RPM (60 Hz) 1500 RPM (50 Hz).
a. Verify GSC is set for 50 or 60 Hz operation. If not, reprogram GSC and verify reprogramming (WP 0083).
b. Reprogram DVR (WP 0083).
c. If programming is correct or will not verify, on EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.
d. Replace GSC (WP 0041).

STEP 10. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

NOTE

If low voltage occurs when load is first connected, excessive motor-starting currents in load may be the fault. Compressor starting currents may be too great for generator set. Air conditioner, refrigerator, and freezer compressor motors often require 5 to 10 times their rated current during start-up. If all of these loads are started at the same time, generator overload is possible.

SYMPTOM

11. Generator Produces Low Voltage When Load is Applied.

MALFUNCTION

DVR Malfunction.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to MANUAL START.

STEP 2. Monitor current at instant of load connection. Current should be less than rated current and the same in each leg.

STEP 3. If current is too close to rated current, generator is being overloaded. Reduce load or add another generator set in parallel.

STEP 4. Check current in each leg of output.

STEP 5. If current is not equal in all legs, selectively turn off loads until balanced.

STEP 6. Reconfigure loads as necessary or check for load failure.

STEP 7. Measure voltage at load connection terminals. Measure voltage at load.

STEP 8. If voltage drop from generator to load is more than 10%, increase wire size between generator set and load.

STEP 9. Check DVR parameter :30 (droop percentage). Voltage should not drop lower than the droop percentage will allow.
a. If output goes lower than the droop percentage allows, on EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.
b. Replace DVR (WP 0042) and retest system.
c. If DVR replacement does not resolve problem, replace generator (WP 0095).

STEP 10. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

SYMPTOM

12. Generator Produces Fluctuating Voltage.

MALFUNCTION

DVR Malfunction.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to MANUAL START.

STEP 2. Check current in each leg of output. Current should be much less than rated current and the same in each leg.

STEP 3. If current is too close to rated current, generator is overloaded. Reduce load or add generator set in parallel.

STEP 4. If current is not equal in all legs selectively turn off loads until balanced.

STEP 5. Reconfigure loads as necessary or check for load failure.

STEP 6. Check engine speed using tachometer: 1800 RPM (60 Hz) and stable. 1500 RPM (50 Hz) and stable.

STEP 7. If engine speed follows voltage fluctuations, go to Engine misfires, runs rough, or is unstable troubleshooting procedure (SYMPTOM 21).

STEP 8. Check load(s) for fluctuations.
a. Disconnect one load at a time until unstable load is determined.
b. Repair or replace unstable load, or reconfigure system to accommodate load.
c. If all loads are stable, on EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.
d. Replace DVR (WP 0042) and retest system.
e. If DVR replacement does not resolve problem, replace generator (WP 0095).

STEP 9. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

SYMPTOM

13. Generator Produces High Voltage.

MALFUNCTION

DVR Malfunction.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to MANUAL START.

STEP 2. Check voltage at load connection terminals.
a. Check programming of GSC and DVR for the position of the reconnection board (WP 0083 and WP 0014).
b. Reprogram as required (WP 0083).

STEP 3. Verify load connections. Reconfigure load connections for the desired voltage (WP 0014) and TM 9-6115-730-10.

STEP 4. Check power factor of load. If not close to 1.0, excessive leading power factor (capacitive load) can cause voltage to climb out of control. Reconfigure load.

STEP 5. Check voltage adjust potentiometer.
a. Adjust VOLTAGE potentiometer for lower voltage, as required.
b. If the problem is not resolved, on EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.
c. Replace DVR (WP 0042) and retest system.

STEP 6. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

SYMPTOM

14. Generator is Overheating.

MALFUNCTION

Excessive Generator Load.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to MANUAL START.

STEP 2. Check ventilation screens. Unclog screens, as required.

STEP 3. Check ambient temperature. Improve ventilation, or reduce load.

STEP 4. Check temperature of air at intake. Improve ventilation, or reduce load.

STEP 5. Check current in each leg of output.
a. If not less than rated current, reduce load.
b. Add a generator set in parallel.
c. If load is unbalanced, reconfigure load to improve balance from leg to leg.

STEP 6. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

SYMPTOM

15. Equipment Runs Normally on Other Source of Power (Utility or Other Generator Set), But Will Not Run on This Generator Set.

MALFUNCTION

Improper Load.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to MANUAL START.

STEP 2. Verify output of generator set is proper voltage and frequency ± 10%. Reset GSC and DVR parameters to obtain desired output (WP 0083).

STEP 3. Check nameplates of load equipment to verify generator set output programming is correct for device(s). Delete load or reset GSC and DVR parameters to obtain desired output (WP 0083).

NOTE

Analyze load. Excessive silicon controlled rectifier (SCR) (Thyristor) equipment connected to generator set may distort waveform and equipment that will not run may be more sensitive to waveform distortion than most. Example of SCR equipment would be anything with a variable speed drive 1/4 HP or more. Lamp dimmers are also a source of the kind of noise that creates problems with other equipment.

STEP 4. Disconnect SCR equipment and see if that improves operation.

STEP 5. May need isolation transformer for SCR or sensitive equipment to prevent distortion on the generator output.

STEP 6. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

SYMPTOM

16. Undesirable Speed Decrease With Load Increase.

MALFUNCTION

Improper Engine Operation.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. On resistor assembly A7, verify position of ISOCHRONOUS/DROOP switch (TM 9-6115-730-10, WP 0006) and (FO-4, sheet 5).

STEP 3. If in DROOP mode, go to STEP 4.

STEP 4. On load resistor assembly A7, measure continuity A7-2 A7-1 (FO-4, sheet 4). If continuity exists, replace ISOCHRONOUS/DROOP switch (WP 0042).

STEP 5 If ISOCHRONOUS/DROOP switch is good, set to DROOP.

STEP 6. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn ENGINE CONTROL switch to MANUAL START.

STEP 7. Check for continuity between LSM module A4-14 and resistor assembly A7-1.
a. If continuity is present, proceed to STEP 8.
b. If continuity is not present, replace main load contactor K1 (WP 0049).

STEP 8. Try operating in ISOCHRONOUS mode.
a. Problem caused by improper engine operation. Engine may not be developing enough horsepower.
b. Go to Low power/poor or no response to throttle troubleshooting procedure (SYMPTOM 22).

STEP 9. Set ISOCHRONOUS/DROOP switch to DROOP.

STEP 10. Note position of droop potentiometer on LSM A4.

STEP 11. Rotate potentiometer counterclockwise (decrease droop percentage).
a. Problem caused by improper engine operation. Engine may not be developing enough horsepower.
b. Go to Low power/poor or no response to throttle troubleshooting procedure (SYMPTOM 22).

STEP 12. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

NOTE

Problems, which look like load sharing problems when generator sets are operated in parallel, are often caused by erratic operation of one of the DVR units.

SYMPTOM

17. Load Sharing Module (LSM) A4 Erratic Operation.

MALFUNCTION

Load Gain Adjustment.

CORRECTIVE ACTION

STEP 1. Disconnect generator set completely from load.

STEP 2. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to MANUAL START.

STEP 3. Operate independently with load.

STEP 4. Verify operation of DVR.
a. If DVR operation is incorrect, on EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.
b. Troubleshoot DVR (WP 0010).

STEP 5. Perform the load gain adjustment procedure except set the voltage to 3.0 Vdc instead of 6 Vdc. Adjust LSM A4 load gain (WP 0042).

STEP 6. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

SYMPTOM

18. Engine Not Properly Sharing Load With Other Generator Sets (Parallel Operation).

MALFUNCTION

Load Sharing Module Malfunction.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to MANUAL START.

STEP 2. Apply full load to generator set.

STEP 3. Measure voltage LSM A4-22 (+) and A4-23 (-)(FO-4, sheet 2). If voltage is not 6.0 Vdc ± 1.0 Vdc at full load, perform LSM A4 load gain adjustment (WP 0042) of each generator set running isochronously not paralleled.

STEP 4. Check frequency setting of all units when off line with no load. If not identical, readjust frequency settings to be identical.

STEP 5. On Resistor Assembly A7 check position of ISOCHRONOUS/DROOP switch.

STEP 6. If in DROOP mode, go to STEP 7.

STEP 7. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 8. On LSM A4, measure continuity between A4-13 and A4-14.
a. If no continuity, replace ISOCHRONOUS/DROOP switch (WP 0042).
b. If ISOCHRONOUS/DROOP switch is good, replace main load contactor K1 (WP 0049).

STEP 9. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to MANUAL START.

STEP 10. Try operating in ISOCHRONOUS mode.
a. Problem caused by improper engine operation. Engine may not be developing enough horsepower.
b. Go to Low power/poor or no response to throttle troubleshooting procedure (SYMPTOM 22).

STEP 11. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

WARNING

Batteries give off a flammable gas. Do not smoke or use open flame when performing maintenance. Failure to comply can cause injury or death to personnel and equipment damage due to flames and explosion.

Lifting batteries from the battery tray can cause back strain. Ensure proper lifting techniques are used when lifting batteries. Failure to comply can cause serious personal injury.

Battery acid can cause burns to unprotected skin. Wear protective gloves and safety goggles. Failure to comply can cause injury to personnel.

When disconnecting or removing batteries, disconnect the negative lead that connects directly to the grounding stud first. Disconnect the negative end of the interconnection cable next. When installing batteries, reverse the connection sequence. Failure to comply can cause serious injury to personnel.

SYMPTOM

19. Engine Will Not Crank (Starter Pinion Engages and Engine Does Not Turn Over).

MALFUNCTION

Starter Motor Defective.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. Check battery voltage on GSC display.
- a. If battery voltage is 22 Vdc or greater, proceed to STEP 5.
- b. If battery voltage is less than 22 Vdc, proceed to STEP 3.

STEP 3. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 4. Inspect cables between battery, Battery Disconnect Switch, and starter solenoid (FO-1, sheet 2).
- a. Clean and tighten cable ends, as required.
- b. Replace cable(s), as required (WP 0048).

WARNING

NATO connector has 24 Vdc battery voltage available continuously. Use caution when connecting DVM to NATO connector.

STEP 5. Connect DVM to NATO connector bottom terminal (+) and top terminal (-).

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

CORRECTIVE ACTION - Continued

CAUTION

Crank engine only for a few seconds, long enough to read DVM, or damage to batteries or starting motor may result.

STEP 6. Set DEAD CRANK SWITCH to CRANK and monitor voltage displayed on DVM.
a. If battery voltage is 18 Vdc or greater, charge batteries and proceed to STEP 7.
b. If battery voltage is 16 Vdc or less, replace batteries (WP 0050).

STEP 7. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 8. Bench-test starting motor. If motor fails replace starter (WP 0076).

STEP 9. Verify free movement of generator. If generator does not turn freely, replace generator G1 (WP 0095).

STEP 10. Verify timing bolt was not left in flywheel after setting valve lash. If timing bolt was left in flywheel, remove pin (WP 0119).

STEP 11. Remove the injectors and check for fluid in the cylinders (hydraulic cylinder lock). Remove fluid from cylinder (WP 0120).

STEP 12. Remove and disassemble engine accessories that can lock up the engine (oil pump WP 0111 or fuel transfer pump WP 0102).

STEP 13. If the problem is not resolved, replace the engine (WP 0096).

STEP 14. Verify the problem has been resolved.

SYMPTOM

20. Engine Cranks But Will Not Start.

MALFUNCTION

Fuel Delivery Problem.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Check for a fuel supply problem and verify fuel pressure (WP 0013, SYMPTOM 10).

STEP 3. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

MALFUNCTION

Engine Timing Incorrect.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. Verify engine speed during cranking using GSC readout of engine speed.
a. If speed is not greater than 50 rpm during cranking, perform load test on batteries. Check batteries and cables as required. Replace as required (WP 0050).
b. If batteries are good, replace starter (WP 0076).

STEP 3. Inspect and adjust engine timing sensors.
a. Inspect sensors and adjust if good (WP 0013, SYMPTOM 3).
b. If sensors are damaged, replace/adjust sensors (WP 0013, SYMPTOM 3).

STEP 4. Perform Engine Timing Sensor Calibration (WP 0013, SYMPTOM 8). Replace defective injector (WP 0118), if necessary.

STEP 5. Verify the problem has been resolved.

MALFUNCTION

Personality Module Mismatch.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Check for correct installation of ECM to EMCP harness connector ENG-P1 to ECM J1 and of engine harness connector ENG-P1 to ECM J2 (cables plugged in to ECM) (FO-2, sheet 1 and sheet 2) and (WP 0088), Figure 2, sheet 3). Plug connectors in securely.

STEP 3. Check engine harness timing sensor connectors ENG-P401 and ENG-P402 and unit injector connector ENG-P300/J300. Plug connectors in securely.

STEP 4. Verify that CID 253 FMI 02 personality module mismatch is not displayed on the GSC. If the ECM has a problem with the internal personality module, the engine will crank, but will not start. Replace ECM (WP 0082).

STEP 5. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

MALFUNCTION

Ether Injection System Malfunction.

CORRECTIVE ACTION

STEP 1. Verify that Ether is enabled in the system configuration parameters (WP 0083).

NOTE

The Ether Injection System is active only during the following conditions:
The engine speed is less than 35 RPM.
The coolant temperature or the intake manifold air temperature is less than 32ºF (0ºC).

STEP 2. If these conditions are present, troubleshoot Ether Injection System (WP 0013, SYMPTOM 4).

STEP 3. If these conditions are not present, proceed to next malfunction.

STEP 4. Verify the problem has been resolved.

MALFUNCTION

Winterization Kit Malfunction.

CORRECTIVE ACTION

STEP 1 On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. If fuel-fired heater was on, check wiring and continuity between winterization kit control panel and fuel-fired heater (FO-1, sheet 6).
a. Repair or replace wiring harness (WP 0088 and WP 0091).
b. Inspect and repair or replace heater hoses (WP 0091).
c. Repair or replace heater control box (WP 0089).
d. Replace fuel-fired heater (WP 0090).

STEP 3. Check for presence of congealed fuel (wax). If congealed fuel is found, drain tank and replace fuel TM 9-6115-730-10 and fuel filters (WP 0061 and WP 0080).

STEP 4. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

WARNING

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/or liquids can result in burns and scalding. Shut down generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply can cause injury or death to personnel.

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set, and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply can cause injury or death to personnel.

SYMPTOM

21. Engine Misfires, Runs Rough, or is Unstable.

MALFUNCTION

Fuel Supply Problem.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Verify fuel quality. If fuel is not clean or if signs of wax are present, drain and replace fuel TM 9-6115-730-10.

STEP 3. Check for a fuel supply problem and verify fuel pressure (WP 0013, SYMPTOM 10).

STEP 4. If no fuel supply problem is found, engine has an internal problem. Replace the engine (WP 0096).

STEP 5. Verify the problem has been resolved.

MALFUNCTION

Electrical Connections Faulty.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. Check DC voltage at slave relay (SRY) pin 87 (+) with respect to 86 (-) (FO-2, sheet 2).
- a. If voltage is not 24 Vdc, Measure voltage at SRY pin 30 (+) with respect to 86 (-).
- b. If voltage is 24 Vdc, measure SRY pin 85 (+) with respect to 86 (-).
- c. If voltage is 24 Vdc, replace SRY (WP 0042).
- d. If voltage is not 24 Vdc, replace GSC (WP 0041).
- e. If voltage at SRY pin 30 is not 24 Vdc, measure voltage across CB-4.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

CORRECTIVE ACTION - Continued

f. If voltage is greater than 0.2 Vdc, replace CB-4 (WP 0055).

g. Verify voltage at batteries. Recharge or replace batteries as required (WP 0050).

STEP 3. Check for correct installation of ECM to EMCP harness connector ENG-P1 to ECM J1 and of engine harness connector ENG-P2 to ECM J2 (cables plugged in to ECM) (FO-2, sheet 1 and sheet 2) and (WP 0088, figure 2, sheet 3). Plug connectors in securely and torque the ENG-P1/J1 and ENG-P2/J2 connectors to 55 lb. in.

STEP 4. Check engine harness timing sensor connectors ENG-P401 and ENG-P402 and unit injector connector ENG-P300/J300. Plug connectors in securely.

STEP 5. Verify connections between LSM pins A4-19 and A4-20 and the ECM input pins ENG-P1-5 and ENG-P1-66 (FO-4, sheet 2 and FO-3, sheets 1 and 2). Look specifically for intermittent connections FO-2, sheet 1. Repair or replace wiring, as required (WP 0044 and WP 0088).

STEP 6. Verify the problem has been resolved.

MALFUNCTION

ECM may not be leaving cold mode operation.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to MANUAL START.

STEP 2. Check coolant temperature using GSC.

a. Coolant temperature should start at ambient temperature and rise above 64°F (17°C) as the engine warms up.

b. If GSC temperature reading does not increase properly, replace coolant temperature sensor (WP 0098).

c. If engine does not warm up, replace engine coolant temperature thermostat(s) (WP 0081).

STEP 3. Verify the problem has been resolved.

MALFUNCTION

Inlet Air or Exhaust Restrictions.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Check for dirty or clogged air filters. Replace air filters (WP 0071).

STEP 3. Check exhaust system for restrictions. Repair or replace components, as required (WP 0069).

STEP 4. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

WARNING

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/or liquids can result in burns and scalding. Shut down generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply can cause injury or death to personnel.

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set, and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply can cause injury or death to personnel.

SYMPTOM

22. Low Power/Poor or No Response to Throttle.

MALFUNCTION

Programmed Parameters Incorrect.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. Check all programmed parameters on GSC and DVR, and verify that they are correct for the voltage selected by the reconnection board. Reprogram parameters, as required (WP 0083).

STEP 3. Verify the problem has been resolved.

MALFUNCTION

Fuel Supply Problems.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Verify fuel quality. If fuel is not clean or if signs of wax are present, drain and replace fuel and filters (WP 0061 and WP 0080).

STEP 3. Check air inlet turbo pipes and exhaust for restrictions and leaks.
a. Remove restrictions.
b. Clean air filters (WP 0071).
c. Repair air leaks found (WP 0072).

STEP 4. Check for a fuel supply problem and verify fuel pressure (WP 0013, SYMPTOM 10).

STEP 5. If no fuel supply problem is found, engine has an internal problem. Replace the engine (WP 0096).

STEP 6. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

MALFUNCTION

ECM may not be leaving cold mode operation.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. Turn ENGINE CONTROL switch to MANUAL START.

STEP 2. Check coolant temperature using GSC.
a. Coolant temperature should start at ambient temperature and rise above 64°F (17°C) as the engine warms up.

b. If GSC temperature reading does not increase properly, replace coolant temperature sensor (WP 0098).

c. If engine does not warm up, replace engine coolant temperature thermostat(s) (WP 0081).

STEP 3. Verify the problem has been resolved.

MALFUNCTION

Harness Connections Faulty.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Check for correct installation of ECM to EMCP harness connector ENG-P1 to ECM J1 and of engine harness connector ENG-P2 to ECM J2 (cables plugged in to ECM) (FO-2, sheet 1 and sheet 2). Plug connectors in and torque the ENG-P1/J1 and ENG-P2/J2 connectors to 55 lb. in.

STEP 3. Check engine harness timing sensor connectors ENG-P401 and ENG-P402 and unit injector connector ENG-P300/J300. Plug connectors in securely.

STEP 4. Verify connections between LSM pins A4-19 and A4-20 and the ECM input pins ENG-P1-5 and ENG-P1-66 (FO-4, sheet 2 and FO-3, sheets 1 and 2). Look specifically for intermittent connections (FO-2, sheet 1). Repair or replace wiring, as required (WP 0044 and WP 0088).

STEP 5. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

NOTE

Use the following procedure whether the engine shuts down completely and had to be restarted or if it falters and does not require restarting. If problem occurs only after engine is warmed up and disappears after engine cools down, problem may be circuit breakers overheating. Check carefully for hot spots and repair or replace, as required.

SYMPTOM

23. Intermittent Engine Shut Downs.

MALFUNCTION

Electrical Connections Faulty.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Check for correct installation of ECM to EMCP harness connector ENG-P1 to ECM J1 and of engine harness connector ENG-P2 to ECM J2 (cables plugged in to ECM) (FO-2, sheet 1 and sheet 2, and WP 0088, figure 2, sheet 3). Plug connectors in and torque the ENG-P1/J1 and ENG-P2/J2 connectors to 55 lb. in.

STEP 3. Check engine harness timing sensor connectors ENG-P401 and ENG-P402 and unit injector connector ENG-P300/J300. Plug connectors in securely.

STEP 4. Verify connections between LSM pins A4-19 and A4-20 and the ECM input pins ENG-P1-5 and ENG-P1-66 (FO-4, sheet 2 and FO-3, sheets 1 and 2). Look specifically for intermittent connections. Repair or replace wiring, as required (WP 0044 and WP 0088).

STEP 5. Refer to Low power/poor or no response to throttle troubleshooting procedure SYMPTOM 22.

STEP 6. Check load. Verify load is not causing problem. Replace or reconfigure load.

STEP 7. Verify the problem has been resolved.

SYMPTOM

24. Excessive Black Smoke.

MALFUNCTION

Air Inlet Problem.

CORRECTIVE ACTION

STEP 1. Check the air inlet and exhaust for restrictions and leaks.
- a. Check for a restriction in the air inlet. Inspect and clear the obstruction.
- b. Clean or replace air inlet filter (WP 0071).

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

CORRECTIVE ACTION - Continued

c. Repair any air leaks in the air inlet system (WP 0072).

d. Check for loose clamps or broken expansion joints on all pipes between the turbo and air-to-air after cooler and between the air-to-air aftercooler and engine intake manifold.

e. If there are no problems with the air inlet system, replace failed atmospheric or turbo inlet pressure sensor (WP 0098).

STEP 2. Check for failed turbocharger. Repair or replace turbocharger as required (WP 0103).

STEP 3. Verify the problem has been resolved.

MALFUNCTION

Engine Timing.

CORRECTIVE ACTION

STEP 1. Inspect/adjust engine timing sensors.

a. Inspect sensors and install and adjust if good (WP 0013, SYMPTOM 3).

b. If sensors are damaged, replace and adjust sensors (WP 0013, SYMPTOM 3).

STEP 2. Check valve adjustment.

a. Readjust valves, as required (WP 0119).

b. If any valves cannot be adjusted to specifications, replace the cylinder head (WP 0120).

STEP 3. Check proper timing orientation between crankshaft and camshaft drive gears.

STEP 4. Verify the problem has been resolved.

MALFUNCTION

Fuel Supply Problem.

CORRECTIVE ACTION

STEP 1. Check for a fuel supply problem and verify fuel pressure (WP 0013, SYMPTOM 10).

STEP 2. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set, and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply can cause injury or death to personnel.

SYMPTOM

25. Excessive White Smoke.

MALFUNCTION

Engine Temperature Low.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to MANUAL START.

STEP 2. Check coolant temperature using GSC. (ECM may not be leaving cold mode operation.) Coolant temperature rises above 64°F (17°C) as engine heats up.

a. Verify actual temperature using temperature adapter 6V-9130 and multimeter 146-4080.
b. If GSC temperature reading does not match reading on the temperature adapter/multimeter, replace coolant temperature sensor (WP 0098).
c. If engine does not warm up, replace engine coolant temperature thermostat(s) (WP 0081).

STEP 3. Verify the problem has been resolved.

MALFUNCTION

Engine Timing

CORRECTIVE ACTION

STEP 1. Inspect/adjust engine timing sensors.
a. Inspect sensors and adjust if good (WP 0098).
b. If sensors are damaged, replace and adjust sensors (WP 0098).

STEP 2. Check proper orientation between crankshaft and camshaft drive gears.

STEP 3. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

MALFUNCTION

Fuel Supply Problem

CORRECTIVE ACTION

STEP 1. Check for a fuel supply problem and verify fuel pressure (WP 0013, SYMPTOM 10).

STEP 2. Verify the problem has been resolved.

MALFUNCTION

Coolant Leak

CORRECTIVE ACTION

Coolant leakage into the cylinder or exhaust system can produce symptoms similar to white smoke emissions from unburned fuel. Replace the engine (WP 0096).

SYMPTOM

26. Can Not Reach Operating Engine RPM.

MALFUNCTION

Unresolved Codes.

CORRECTIVE ACTION

Check for fault codes that could cause engine degradation performance.

MALFUNCTION

Insufficient Inlet Air

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Check air filters for dirty or clogged filters. Replace air filters (WP 0071).

STEP 3. Check exhaust system for restrictions. Remove restrictions (WP 0069).

STEP 4. Verify the problem has been resolved.

MALFUNCTION

Throttle Malfunction

CORRECTIVE ACTION

STEP 1. Go to Poor Acceleration or Response SYMPTOM 27 within this work package.

STEP 2. If the problem is not resolved, perform Speed Control Test (WP 0013, SYMPTOM 6).

STEP 3. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

MALFUNCTION

Fuel Supply Problem.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Check the fuel lines for restriction, collapsed lines, and pinched lines (WP 0016).

STEP 3. Check the fuel tank for foreign objects or debris which may block the fuel lines (per TM 9-6115-730-10).

STEP 4. Prime the fuel system if any of the following have been performed.
a. Replacement of the fuel filters (WP 0061 AND WP 0080).
b. Service on the low pressure fuel supply circuit.
c. Replacement of unit (fuel) injectors (WP 0118).

STEP 5. Purge air from the low pressure fuel supply circuit.

STEP 6. Check the fuel pressure after the fuel filter while the engine is being cranked (WP 0013, SYMPTOM 10). Perform steps for SYMPTOM 20, MALFUNCTION Fuel Delivery Problem.
a. If the fuel pressure is low, replace the fuel filters (WP 0061 AND WP 0080).
b. If the fuel pressure is still low, check the following items.
(1) Fuel transfer pump (WP 0102).
(2) Fuel transfer pump coupling (WP 0102).
(3) Fuel pressure regulating valve (WP 0102).

STEP 7. Perform Injector Solenoid Test and Cylinder Cutout Test (WP 0013, SYMPTOM 5).

STEP 8. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

MALFUNCTION

Engine Temperature

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to MANUAL START.

STEP 2. Check coolant temperature using GSC. (ECM may not be leaving cold mode operation.). Coolant temperature rises above 64°F (17°C) as engine heats up.

a. Verify actual temperature using temperature adapter 6V-9130 and multimeter 146-4080 or thermometer.
b. If GSC temperature reading does not match reading on the temperature adapter/multimeter, replace coolant temperature sensor (WP 0098).
c. If engine does not warm up, replace engine coolant temperature thermostat(s) (WP 0081).

STEP 3. Verify the problem has been resolved.

MALFUNCTION

Generator Faulty.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL Switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Inspect generator for problem, which would place excess load on engine. Repair or replace components, as required or replace generator (WP 0095).

STEP 3. If replacing generator does not correct the problem, there is an internal engine problem. Replace the engine (WP 0096).

STEP 4. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

SYMPTOM

27. Poor Acceleration or Response.

MALFUNCTION

Throttle Malfunction

CORRECTIVE ACTION

STEP 1. Perform Speed Control Test (WP 0013, SYMPTOM 6).

STEP 2. Start generator set per TM 9-6115-730-10.

STEP 3. Monitor Fuel Position and Rated Fuel Limit during operation at full load. If Fuel Position does not equal Rated Fuel Limit, check the following (WP 0013, SYMPTOM 11):
a. Check Turbo Outlet Pressure Sensor and verify an approximate pressure of 4 to 6 PSI (27.6 to 41.4 Kpa) (WP 0013, SYMPTOM 11).
b. Monitor atmospheric pressure (14.6 PSI (100.7 kpa)) and boost pressure (approximately 18 PSI (124.1 Kpa)). If not correct, repair or replace turbocharger (WP 0107).

STEP 4. Verify the problem is resolved.

MALFUNCTION

Engine Temperature Low.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to MANUAL START.

STEP 2. Check coolant temperature using GSC.
a. Coolant temperature should start at ambient temperature and rise above 64ºF (17ºC) as the engine warms up.
b. If GSC temperature reading does not increase properly, replace coolant temperature sensor (WP 0098).
c. If engine does not warm up, replace engine coolant temperature thermostat(s) (WP 0081).

STEP 3. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

MALFUNCTION

Electrical Connections Faulty

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Check for correct installation of ECM to EMCP harness connector ENG-P1 to ECM J1 and of engine harness connector ENG-P2 to ECM J2 (cables plugged in to ECM) (WP 0088 and FO-2, sheet 1 and sheet 2).

STEP 3. Check engine harness timing sensor connectors ENG-P401 and ENG-P402 and unit injector connector ENG-P300/J300. Plug connectors in securely (WP 0088).

STEP 4. Verify connections between LSM A4 pins A4-19 and A4-20 and the ECM input pins ENG-P1-5 and ENG-P1-66 (FO-4, sheet 2 and FO-3, sheets 1 and 2). Look specifically for intermittent connections. Repair or replace wiring, as required (WP 0088).

STEP 5. Verify the problem is resolved.

MALFUNCTION

Fuel Supply Problem.

CORRECTIVE ACTION

STEP 1. Perform Cylinder Cutout Test (WP 0013, SYMPTOM 5) to check for any non-operable unit injectors. If necessary, replace faulty injectors (WP 0118).

STEP 2. Check for a fuel supply problem and verify fuel pressure (WP 0013, SYMPTOM 10).

STEP 3. Verify the problem is resolved.

MALFUNCTION

Insufficient Inlet Air.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Check for dirty or clogged air filters. Replace air filters (WP 0071).

STEP 3. Check exhaust system for restrictions. Repair or replace components, as required (WP 0069).

STEP 4. Verify the problem is resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

SYMPTOM

28. Poor Fuel Consumption.

MALFUNCTION

Insufficient Inlet Air.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Check for dirty or clogged air filters. Replace air filters (WP 0071).

STEP 3. Check exhaust system for restrictions. Repair or replace components, as required (WP 0069).

STEP 4. Verify the problem has been resolved.

MALFUNCTION

Electrical Connections.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Inspect/adjust engine timing sensors.
a. Inspect sensor and install and adjust if good (WP 0098).
b. If sensors are damaged, replace/adjust sensors (WP 0013, SYMPTOM 3).

STEP 3. Check for correct installation of ECM to EMCP harness connector ENG-P1 to ECM J1 and of engine harness connector ENG-P2 to ECM J2 (cables plugged in to ECM) (FO-2, sheet 1 and sheet 2). Plug connectors in securely and torque ENG-P1/J1 and ENG-P2/J2 connectors to 55 lb. in. (WP 0088).

STEP 4. Check engine harness timing sensor connectors ENG-P401 and ENG-P402 and unit injector connector ENG-P300/J300. Plug connectors in securely (WP 0088).

STEP 5. Verify connections between LSM pins A4-19 and A4-20 and the ECM input pins ENG-P1-5 and ENG-P1-66 (FO-4, sheet 2 and FO-3, sheets 1 and 2). Look specifically for intermittent connections. Repair or replace wiring, as required (WP 0088).

STEP 6. Verify the problem is resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

MALFUNCTION

Fuel Supply Problem.

CORRECTIVE ACTION

STEP 1. Perform Injector Solenoid Test and Cylinder Cutout Test (WP 0013, SYMPTOM 5). Replace faulty injectors (WP 0118).

STEP 2. Check for a fuel supply problem and verify fuel pressure (WP 0013, SYMPTOM 10).

MALFUNCTION

Generator Malfunction.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Inspect generator for problems or restrictions that would place excess load on engine. Visually check generator rotor shaft for excessive play, vibration, or noise. If necessary, replace generator (WP 0095).

STEP 3. Verify the problem has been resolved.

SYMPTOM

29. Engine Stalls at Low RPM.

MALFUNCTION

Electrical Connections Faulty.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL Switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Check for correct installation of engine harness ENG-P2 connector to ECM J2 and engine harness connector ENG-P300 to fuel injector harness connector J300 (WP 0088).

STEP 3. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

MALFUNCTION

Fuel Supply Problem.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Check the fuel lines for restriction, collapsed lines, and pinched lines.

STEP 3. Check the fuel tank for foreign objects or debris which may block the fuel lines.

STEP 4. Prime the fuel system if any of the following have been performed (WP 0078).
a. Replacement of the fuel filters.
b. Service on the low pressure fuel supply circuit.
c. Replacement of unit (fuel) injectors.

STEP 5. Purge air from the low pressure fuel supply circuit using the fuel priming pump.

STEP 6. Check the fuel pressure after the fuel filter while the engine is being cranked (WP 0013, SYMPTOM 10).
a. If the fuel pressure is low, replace the fuel filters (WP 0080).
b. If the fuel pressure is still low, check the following items (WP 0102).
(1) Fuel transfer pump
(2) Fuel transfer pump coupling.
(3) Fuel pressure regulating valve.

STEP 7. Perform the Injector Solenoid Test and the Cylinder Cutout Test (WP 0013, SYMPTOM 5).

STEP 8. Verify the problem has been resolved.

MALFUNCTION

Generator Malfunction.

CORRECTIVE ACTION

Inspect generator for problems or restrictions that would place excess load on engine. Visually check generator rotor shaft for excessive play, vibration, or noise (WP 0094). If problem is not resolved, go to Engine Misfires, Runs Rough, or is Unstable (SYMPTOM 21).

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

SYMPTOM

30. Auxiliary Fuel Pump Does Not Operate.

MALFUNCTION

Auxiliary Fuel Pump Solenoid Valve.

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. Check for 24 Vdc across auxiliary fuel pump valve (AFPV) pins 1 and 2 with AUX FUEL switch ON. Listen for a auxiliary fuel pump and AFPV operation.
a. If 24 Vdc is present, proceed to STEP 3.
b. If 24 Vdc is not present, proceed to STEP 7.

STEP 3. Set Battery Disconnect Switch to OFF/RESET. Set DEAD CRANK SWITCH to OFF. On EMCP set ENGINE CONTROL switch to OFF/RESET.

STEP 4. On EMCP, set AUX FUEL switch to OFF (down).

STEP 5. Open left front doors, left rear doors, and right rear doors.

STEP 6. Verify continuity between auxiliary fuel pump valve (AFPV) pin 2 and TB5-21 (FO-1, sheet 3). Repair or replace wire harness (WP 0088).

STEP 7. Measure resistance between AFPV-1 and TB5-21. If resistance not between 40 and 80 ohms, replace AFPV (WP 0059).

STEP 8. Verify the problem has been resolved.

MALFUNCTION

Fuel Level Switch Assembly.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Measure resistance between fuel level switch assembly FL2B at J8-2 and relay AFPR-8. If not less than 2 ohms, repair or replace wire harness (WP 0088).

STEP 3. Measure resistance between fuel level switch assembly FL2B at J8-1 and AUX FUEL pump switch (AFPS) pin 1 (FO-1, sheet 3 and FO-4, sheet 5). If not less than 2 ohms, repair or replace wire harness (WP 0088).

STEP 4. Check for continuity between J8-3 and AFPV pin 14.
a. If continuity exists, proceed to STEP 5.
b. If continuity does not exist, troubleshoot wiring (WP 0088).

STEP 5. Unplug connector P8 from fuel level switch assembly FL2 (WP 0056).

STEP 6. If fuel tank level indicator on EMCP shows between 3/4 and FULL, measure continuity between J8-1 and J8-2. If not open circuit, replace fuel level switch assembly (WP 0056).

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

CORRECTIVE ACTION - Continued

STEP 7. If fuel tank level is between 3/4 and FULL, measure continuity between J8-3 and J8-2. If not open circuit, replace fuel level switch assembly (WP 0056).

STEP 8. If fuel tank level is below 1/2, measure continuity between J8-1 and J8-2. If not short circuit, replace fuel level switch assembly (WP 0056).

STEP 9. If fuel tank level is below 1/2, measure continuity between J8-2 and J8-3. If not short circuit, replace fuel level switch assembly (WP 0056).

STEP 10. If fuel tank level is above 5/8 measure continuity between J8-3 and J8-2. If not open circuit, replace fuel level switch assembly (WP 0056).

STEP 11. Verify the problem has been resolved.

MALFUNCTION

Auxiliary Fuel Pump Relay.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Measure resistance between float level switch FL2B at J8-3 and TB5-21.

STEP 3. If not between 600 and 800 ohms, repair or replace wire harness (WP 0088) or replace AFPR (WP 0059).

STEP 4. If between 600 and 800 ohms, check fuel level switch assembly (WP 0056).

STEP 5. Verify the problem has been resolved.

MALFUNCTION

Auxiliary Fuel Pump Faulty.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Open control box (WP 0020).

STEP 3. Measure resistance between relay AFPR-9 and TB3-10 (FO-4, sheet 2 and sheet 4). If not between 40 and 80 ohms, repair or replace wire harness (WP 0044).

STEP 4. Verify wire from auxiliary fuel pump is connected securely to AFPV-1 (WP 0059). If not secure, repair wiring (WP 0088) or replace auxiliary fuel pump (WP 0059).

STEP 5. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

SYMPTOM

31. Engine Runs Out of Fuel With No LOW FUEL LEVEL Alarm.

MALFUNCTION

Fuel Level Switch Assembly.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. On EMCP, set AUX FUEL switch to OFF (down).

STEP 3. Open left front doors, left rear doors, and right rear doors.

STEP 4. Unplug P11 from low fuel alarm switch FL1 (WP 0056 and FO-1, sheet 3).

STEP 5. With fuel level above two inches or fuel level indicator on EMCP showing fuel, measure resistance between J11-1 and J11-2 (FO-1, sheet 3). If not open circuit, replace fuel level switch assembly (WP 0056).

STEP 6. With fuel level below two inches or fuel level indicator showing empty, measure resistance between J11-1 and J11-2. If not less than 2 ohms, replace fuel level switch assembly (WP 0056).

STEP 7. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

SYMPTOM

32. Alternator Does Not Charge Batteries.

MALFUNCTION

Alternator Drive Belt Loose or Defective.

CORRECTIVE ACTION

STEP 1. On EMCP set Engine Control switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Inspect the condition of the alternator drive belt. If the alternator drive belt is worn or damaged, replace drive belt (WP 0075).

STEP 3. Verify the problem has been resolved.

MALFUNCTION

Charging Circuit Defective.

CORRECTIVE ACTION

STEP 1. On EMCP set Engine Control switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Inspect cables between battery, Battery Disconnect Switch, and starter solenoid (FO-1, sheet 2).

a. Check shunt (R4) for loose/corroded connections. Clean and tighten as required.
b. Clean and tighten battery cable ends, as required.
c. Replace cable(s), as required (WP 0047).
d. If voltage is correct, perform load test on batteries individually (WP 0050).
e. If battery fails, replace battery (WP 0050).
f. If batteries pass load test, charge batteries fully (WP 0050).
g. If voltage is not correct, inspect Battery Disconnect Switch and battery charging circuit (FO-1, sheet 2) or replace alternator (WP 0074).

STEP 3. Set Battery Disconnect Switch to on. Set DEAD CRANK switch to NORMAL. Turn the ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 4. Observe and record battery voltage on GSC display.
a. Set Engine Control Switch to MANUAL START.
b. Observe battery voltage on GSC display. Battery voltage should be 2 Vdc higher than recorded voltage.
c. If voltage falls below minimum, replace alternator (WP 0074).

STEP 5. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

SYMPTOM

33. Coolant in Engine Oil.

MALFUNCTION

Oil Cooler Failure.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Inspect oil cooler for leaks or damage. Replace oil cooler as required (WP 0108).

STEP 3. Verify the problem has been resolved.

MALFUNCTION

Cylinder Head Gasket Failure.

CORRECTIVE ACTION

STEP 1. Replace cylinder head gasket (WP 0120).

STEP 2. Verify the problem has been resolved.

MALFUNCTION

Cracked Cylinder Head.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL Switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Inspect cylinder head for cracks. Replace cylinder head as required (WP 0120).

STEP 3. Verify the problem has been resolved.

MALFUNCTION

Water Pump Failure.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL Switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Inspect the weep hole in the water pump for blockage. Check for signs of leakage around water pump seals. Replace water pump as required (WP 0110).

STEP 3. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

MALFUNCTION

Internal engine leakage.

CORRECTIVE ACTION

STEP 1. Replace the engine (WP 0096).

STEP 2. Verify the problem has been resolved.

SYMPTOM

34. Coolant Temperature Too High.

MALFUNCTION

Excessive Load.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Ensure that the load is not excessive. Redistribute or disengage loads as required.

STEP 3. Verify the problem has been resolved.

MALFUNCTION

Radiator.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Ensure that the engines exhaust does not heat the radiator.

STEP 3. Ensure the air inlet area of the radiator is not obstructed.

STEP 4. Check the fins of the radiator for damage or obstructions. Repair/clean as required (WP 0068).

STEP 5. Verify the problem has been resolved.

MALFUNCTION

Low Coolant Level.

CORRECTIVE ACTION

STEP 1. On EMCP set Engine Control switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Allow generator set to cool and check coolant level. Add coolant as required.

STEP 3. Pressurize the cooling system to 3 psi (20 kPa) greater than the coolant fill cap rating (13 to 16 psi (90 to 800 kPa)).

STEP 4. Inspect all cooling system components for leaks. Repair or replace components as required (WP 0064, WP 0067, WP 0068, WP 0110, and WP 0081).

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

CORRECTIVE ACTION - Continued

STEP 5. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to MANUAL START.

STEP 6. Run the engine to operating temperature. If coolant temperature is normal, proceed to STEP 17.

STEP 7. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 8. Allow generator set to cool and check coolant level. Add coolant as required.

STEP 9. Check for presence of coolant in engine oil. If coolant is present in engine oil, troubleshoot per SYMPTOM 33.

STEP 10. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to MANUAL START.

STEP 11. Run the engine to operating temperature. If coolant temperature is normal, proceed to STEP 17

STEP 12. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 13. Allow generator set to cool and check coolant level. Add coolant as required.

STEP 14. Pressurize the cooling system to 3 psi (20 kPa) greater than the coolant fill cap rating (13 to 16 psi (90 to 800 kPa)).

STEP 15. If pressure reading is not stable after five minutes, inspect all cooling system components for leaks. Repair or replace components as required (WP 0064, WP 0067, WP 0068, WP 0110, and WP 0081).

STEP 16. Pressurize the cooling system to 3 psi (20 kPa) greater than the coolant fill cap rating (13 to 16 psi (90 to 800 kPa)). If pressure reading is not stable after five minutes, replace the engine (WP 0096).

STEP 17. Verify the problem has been resolved.

MALFUNCTION

Air in Coolant.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Inspect coolant fill cap for damage. Replace coolant fill cap as required.

STEP 3. If coolant has been replaced recently, ensure that air has been purged from the cooling system by running the engine for a few minutes.

STEP 4. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

MALFUNCTION

Thermostat Malfunction.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Remove and inspect thermostat. Replace as required (WP 0081).

STEP 3. Verify the problem has been resolved.

MALFUNCTION

Water Pump Malfunction.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Inspect alternator belt. Replace or tighten as required (WP 0075).

STEP 3. Inspect water pump impeller. Replace water pump if impeller is damaged (WP 0110).

STEP 4. Verify the problem has been resolved.

MALFUNCTION

Engine Coolant Flow Restrictions.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. If a buildup of deposits in the cooling system is suspected, clean the cooling system (WP 0067 and WP 0068).

STEP 3. If the flow of coolant through the engine is not sufficient, determine the cause of obstruction and repair as required.

STEP 4. Verify the problem has been resolved.

MALFUNCTION

Exhaust Restriction.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Inspect the exhaust pipes and muffler for damage that could cause restrictions. Repair or replace as required (WP 0069).

STEP 3. Ensure that the exhaust gases are not being drawn into the intake air inlet.

STEP 4. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

MALFUNCTION

Combustion Gases in Coolant.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Check for combustion gases in coolant. Combustion gases in coolant can be identified by small air bubbles in the coolant during engine operation. If combustion gases are present, replace the engine (WP 0096).

STEP 3. Verify the problem has been resolved.

SYMPTOM

35. ECM Will Not Communicate With Other Systems or Display Modules.

MALFUNCTION

Wire or Connector Pins Corroded or Damaged.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Disconnect harness connector ENG-P1 from ECM connector J1, harness connector CDC-P7, and harness connector ENG-P37 from generator connector J37 (WP 0088).

STEP 3. Inspect harness connectors ENG-P1, CDC-P7, and ENG-P37, and generator connector J37 for corrosion or damage. Repair or replace harness as required (WP 0088).

STEP 4. Conduct Wiggle Test (WP 0013, SYMPTOM 1) on each of the harness wires that are associated with the Cat data link (FO-2, sheet 2 and WP 0088). Repair or replace harness as required (WP 0088).

STEP 5. Verify the problem has been resolved.

MALFUNCTION

Cat Data Link Circuitry Short Circuit.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL Switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Disconnect ENG-P1 harness connector from ECM connector J1.

STEP 3. Measure the resistance between ENG-P1 harness connector pin 8 and all other connector pins. All measurements should indicate open, if not repair or replace harness (WP 0088).

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

CORRECTIVE ACTION - Continued

STEP 4. Measure the resistance between ENG-P1 harness connector pin 9 and all other connector pins. All measurements should indicate open, if not repair or replace harness (WP 0088).

STEP 5. Verify the problem has been resolved.

MALFUNCTION

Cat Data Link Circuitry Open Circuit.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Remove cap from harness connector CDC-P7. Disconnect ENG-P1 and ENG-37.

STEP 3. Install a jumper wire between Cat data link harness connector CDC-P7 pins D and E.

STEP 4. Measure the resistance between ENG-P1 harness connector pins 8 and 9. All measurements should indicate a short, if not repair or replace harness (WP 0088).

STEP 5. Measure the resistance between ENG-P37 harness connector pins 19 and 20. All measurements should indicate a short, if not repair or replace harness (WP 0088).

STEP 6. Measure the resistance between ENG-P37 pins 19 and 20. All measurements should indicate a short, if not repair or replace harness (WP 0088) If the ECM does not operate properly, replace ECM (WP 0082).

STEP 7. Remove jumper.

STEP 8. Verify the problem has been resolved.

SYMPTOM

36. Engine Oil in Coolant.

MALFUNCTION

Oil Cooler Failure.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Inspect oil cooler for leaks or damage. Replace oil cooler as required (WP 0108).

STEP 3. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

MALFUNCTION

Cylinder Head Gasket Failure.

CORRECTIVE ACTION

STEP 1. Inspect cylinder head for signs of seepage, if present, replace cylinder head gasket (WP 0120).

STEP 2. Verify the problem has been resolved.

MALFUNCTION

Cracked Cylinder Head Defect.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Inspect cylinder head for cracks. Repair/replace cylinder head as required (WP 0120).

STEP 3. Verify the problem has been resolved.

MALFUNCTION

Water Pump Failure.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Inspect the weep hole in the water pump for blockage. Check for signs of leakage around water pump seals. Replace water pump as required (WP 0110).

STEP 3. Verify the problem has been resolved.

SYMPTOM

37. Engine Oil in Exhaust System.

MALFUNCTION

Crankcase Ventilation System Failure.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Inspect crankcase ventilation filter and replace if necessary (WP 0070).

STEP 3. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

MALFUNCTION

Turbocharger Seals Failure.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Inspect the turbocharger inlet and exhaust manifolds for engine oil. If oil is present, replace turbocharger (WP 0103).

STEP 3. Verify the problem has been resolved.

MALFUNCTION

Worn or Damaged Valve Guide Seals.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Inspect valve guide seals for wear or damage. Replace cylinder head (WP 0120).

STEP 3. Verify the problem has been resolved.

MALFUNCTION

Internal engine oil leakage/Excessive Blow-by.

CORRECTIVE ACTION

STEP 1. Internal engine oil leakage is suspected. Replace engine (WP 0096).

STEP 2. Verify the problem has been resolved.

SYMPTOM

38. Engine Oil Temperature Too High.

MALFUNCTION

Incorrect Engine Oil Specification/Rating.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Verify correct engine oil type and temperature rating for rated engine (WP 0016).

STEP 3. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

MALFUNCTION

Incorrect Oil Level.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Inspect engine oil level. Add correct engine oil as necessary (TM 9-6115-730-10, WP 0016).

STEP 3. Verify the problem has been resolved.

MALFUNCTION

Coolant Temperature is Too High.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. See Coolant Temperature is Too High troubleshooting procedure (SYMPTOM 34).

MALFUNCTION

Engine Oil Cooler Bypass Valve.

CORRECTIVE ACTION

STEP 1. On EMCP set Engine Control switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Clean and inspect the engine oil cooler bypass valve. Clean the bore of the bypass valve and ensure the valve is not stuck in the open position. Replace the bypass valve if necessary (WP 0107).

STEP 3. Verify the problem has been resolved.

MALFUNCTION

Engine Oil Cooler Failure.

CORRECTIVE ACTION

STEP 1. On EMCP set Engine Control switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Inspect for engine oil cooler for damage, blockage, or restrictions in the engine oil cooler oil passages. Replace the engine oil cooler if necessary (WP 0108).

STEP 3. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued
SYMPTOM

39. Engine Vibration.

MALFUNCTION

Engine Misfires or Runs Rough.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. See Engine misfires, runs rough, or is unstable troubleshooting procedure (SYMPTOM 21).

MALFUNCTION

Engine Vibration Damper Defective.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Inspect the engine vibration damper for damage. Inspect for loose, missing, or damaged mounting bolts. Replace vibration damper or mounting bolts as necessary (WP 0104).

STEP 3. Verify the problem has been resolved.

MALFUNCTION

Engine Shock Mounts Defective.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Inspect the engine shock mounts and brackets with the engine running through the speed range. Check for mounts and brackets that loose, missing parts, or damaged. Tighten or replace engine shock mounts as necessary (WP 0096).

STEP 3. Verify the problem has been resolved.

MALFUNCTION

Generator Alignment Incorrect.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Inspect for loose, missing, or damaged generator mounting hardware. Ensure generator to engine connecting hardware is complete and secure (WP 0095).

STEP 3. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

SYMPTOM

40. Excessive Engine Oil Consumption.

MALFUNCTION

Oil Leaks.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Inspect the engine for oil leaks. Repair oil leaks as required.

STEP 3. Check for dirty or clogged crankcase ventilation filters. Clean or replace filters (WP 0070).

STEP 4. Verify the problem has been resolved.

MALFUNCTION

Engine Oil Cooler Defective.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Check for engine oil leaks around the engine oil cooler also check for engine oil in engine coolant. Repair or replace engine oil cooler (WP 0108).

STEP 3. Verify the problem has been resolved.

MALFUNCTION

Turbocharger Defective.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Inspect the air inlet manifold for engine oil. Check for engine oil leakage past the seal rings in the impeller end of the turbocharger shaft. Replace the turbocharger if engine oil leakage is found (WP 0103).

STEP 3. Verify the problem has been resolved.

MALFUNCTION

Valve Guides Defective.

CORRECTIVE ACTION

STEP 1. If valve guide wear is suspected, replace cylinder head assembly (WP 0120).

STEP 2. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

MALFUNCTION

Piston Rings Defective/Excessive Blowby.

CORRECTIVE ACTION

STEP 1. If piston ring wear or damage is suspected, replace the engine (WP 0096).

STEP 2. Verify the problem has been resolved.

SYMPTOM

41. Excessive Valve Lash.

MALFUNCTION

Lack of Lubrication to Rocker Shaft Assembly.

CORRECTIVE ACTION

Remove valve cover (WP 0100) and inspect for adequate engine oil at rocker shaft assembly and valves. If rocker shaft assembly or valves lack engine oil, troubleshoot low engine oil pressure (SYMPTOM 45).

MALFUNCTION

Valve Lash Adjustment Incorrect.

CORRECTIVE ACTION

STEP 1. Visually inspect rocker shaft and valve components for excessive wear. Replace worn components as required (WP 0119).

STEP 2. If rocker shaft and valve components are not excessively worn, adjust valve lash (WP 0119).

STEP 3. Verify the problem has been resolved.

SYMPTOM

42. Exhaust Temperature is Too High.

MALFUNCTION

Air Inlet and Exhaust Malfunctions.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Inspect for air inlet for restrictions or leaks. Clear restrictions and repair leaks (WP 0102).

STEP 3. Inspect for exhaust restrictions. Inspect for leaks between exhaust manifold and turbocharger. Clear restrictions and repair leaks (WP 0115).

STEP 4. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

MALFUNCTION

Electrical Connections Faulty.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Inspect harness connector ENG-P2 and ECM mating connector J2 and unit injector cable connectors ENG-P300 and J300 (WP 0088). Ensure connectors are properly seated and secure.

STEP 3. Verify the problem has been resolved.

MALFUNCTION

Unresolved Diagnostic Codes.

CORRECTIVE ACTION

Check for inactive diagnostic codes in historical log that relate to exhaust temperature. Correct malfunctions as required (WP 0008 and WP 0009).

SYMPTOM

43. Fuel in Engine Oil.

MALFUNCTION

Fuel Unit Injectors Leaking.

CORRECTIVE ACTION

STEP 1. Inspect unit injectors for leaking seals and damage and to ensure unit injectors are secure. Tighten unit injectors or replace as required (WP 0118).

STEP 2. Verify the problem has been resolved.

MALFUNCTION

Fuel Lines Leaking.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Inspect fuel hose connected to the cylinder head for leaks. Replace seals or fuel hoses as required (WP 0057).

STEP 3. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

MALFUNCTION

Crack in Cylinder Head.

CORRECTIVE ACTION

STEP 1. Inspect cylinder head for crack in fuel supply galley or around unit injectors.

STEP 2. Replace cylinder head as necessary (WP 0120).

STEP 3. Verify the problem has been resolved.

MALFUNCTION

Fuel Transfer Pump Defective.

CORRECTIVE ACTION

STEP 1. Inspect fuel transfer pump and fuel hoses for leaks.

STEP 2. Replace fuel transfer pump or fuel hoses as required (WP 0102 and WP 0057).

STEP 3. Verify the problem has been resolved.

SYMPTOM

44. Intermittent Low Power or Power Cutout.

MALFUNCTION

Unresolved Diagnostic Codes.

CORRECTIVE ACTION

Check inactive diagnostic codes. Correct malfunctions as required (WP 0008 and WP 0009).

MALFUNCTION

Throttle Malfunction.

CORRECTIVE ACTION

Verify that the status of the throttle position is stable and that the engine is able to reach high idle speed. If any requirement is not met, perform Speed Control Test (WP 0013, SYMPTOM 6).

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

MALFUNCTION

Low Fuel Pressure.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Check fuel hoses for cuts, kinks, and other obstructions. Repair or replace fuel hoses as required (WP 0057).

STEP 3. Inspect the fuel tank for foreign material that may block the fuel pickup tube or fuel hoses. Remove contaminants and foreign objects from fuel tank (per TM 9-6115-730-10).

STEP 4. Check for air in the fuel system. If air in the fuel is found, check that all fuel fittings are tight and secure. Purge the air from the fuel system using the priming pump.

STEP 5. Check for fault codes indicating fuel filter restrictions. Correct any faults indicated (WP 0008 and WP 0009).

STEP 6. If fuel pressure is still low, replace fuel transfer pump (WP 0102).

STEP 7. Verify the problem has been resolved.

SYMPTOM

45. Low Engine Oil Pressure.

MALFUNCTION

Oil Level Too Low.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Check engine oil level. Add engine oil as necessary (per TM 9-6115-730-10).

STEP 3. Verify the problem has been resolved.

MALFUNCTION

Oil Pressure Sensor Malfunction.

CORRECTIVE ACTION

STEP 1. Check for inactive diagnostic codes. Resolve codes as required.

STEP 2. Verify oil pressure with a 100 PSI minimum gauge connected to oil manifold near oil pressure sensor. If oil pressure not correct, replace engine oil pressure sensor WP 0098).

STEP 3. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

MALFUNCTION

Oil Filter Defective.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Replace the engine oil filter. Inspect the engine oil check valve in the oil filter base. Clean or replace components as required (WP 0107).

STEP 3. Verify the problem has been resolved.

MALFUNCTION

Engine Oil Cooler Defective.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Check for engine oil leaks around the engine oil cooler also check for engine oil in engine coolant. Repair or replace engine oil cooler (WP 0108).

STEP 3. Verify the problem has been resolved.

MALFUNCTION

Fuel in Engine Oil.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Refer to Fuel in Engine Oil procedure troubleshooting procedure (SYMPTOM 43).

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

MALFUNCTION

Camshaft or Crankshaft Defective.

CORRECTIVE ACTION

STEP 1. If the camshaft of crankshaft is suspected of being defective, replace the engine (WP 0096).

STEP 2. Verify the problem has been resolved.

SYMPTOM

46. Mechanical Noise (Knock) in Engine.

MALFUNCTION

Valve Train Components Defective.

CORRECTIVE ACTION

STEP 1. Inspect the valve train components.

STEP 2. Replace damaged components as required (WP 0119).

STEP 3. If components are not damaged or worn, perform valve lash adjustment (WP 0119).

STEP 4. Verify the problem has been resolved.

MALFUNCTION

Internal engine problem.

CORRECTIVE ACTION

STEP 1. Replace the engine (WP 0096).

STEP 2. Verify the problem has been resolved.

TROUBLESHOOTING FAILURES WITHOUT FAULT CODES - Continued

SYMPTOM

47. Noise Coming From Cylinder.

MALFUNCTION

Unresolved Diagnostic Codes.

CORRECTIVE ACTION

Check for active diagnostic codes. Correct malfunctions as required (WP 0008 and WP 0009).

MALFUNCTION

Fuel Supply Problem.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Verify the correct fuel is being used for current environmental conditions. Change fuel as required (per TM 9-6115-730-10).

STEP 3. Verify the problem has been resolved.

MALFUNCTION

Unit Injector Malfunction.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Disconnect harness connector ENG-P1 from ECM connector J1, harness connector P7 from GSC connector J7, and harness connector ENG-P300 from valve cover connector J300 (WP 0088).
a. Perform Injector Solenoid Test (WP 0013, SYMPTOM 5). Repair as required.
b. Thoroughly inspect harness connectors ENG-P1, P7, ENG-P37, and generator connector J37 (WP 0088) for corrosion or damage. Repair or replace harness as required (WP 0088).

STEP 3. Perform Cylinder Cutout test (WP 0013, SYMPTOM 5).

STEP 4. Verify the problem has been resolved.

END OF WORK PACKAGE

FIELD LEVEL TROUBLESHOOTING
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-807A/PU-807A
ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING SOFTWARE INSTALLATION

INTRODUCTION

Before using the Electronic Technician (ET) tool for fault isolation, make note and record all of the fault codes available on the GSC and DVR. Also, note and record any fault lamps that are lit on the GSC and the alarm module. Complete all other Field level troubleshooting. (WP 0004 thru WP 0011).

The failure analysis can begin with a single fault code indication. Because of extensive self-testing capability, a single failure will often generate multiple fault codes. (e.g. a failure of a power supply will generate a failure code for all of the sensors powered up by that power supply). It may be necessary to read through all of the associated fault isolation procedures prior to starting in order to assess the fault location.

The voltages and currents in the 200 kW TQG are dangerous and capable of causing death instantaneously. The engine and generator set are heavy and represent enormous mechanical power. Refer to the WARNING SUMMARY before attempting to troubleshoot system. The following warnings, cautions, and notes should be read and followed during all attempts at troubleshooting.

NOTE

100/200 kW TQG Cat ET software/program is for use on the 100/200 kW TQGs only. Loading 100/200 kW TQG Cat ET software will overwrite existing Cat ET software/program. If commercial Cat ET software is to be reinstalled, record the licensing data prior to installing 100/200 kW TQG Cat ET software/program. The licensing data must be reloaded when reinstalling the original (previous) Cat ET software/program.

WARNING

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

WARNING

Dangerously high voltage can exist across current transformer (CT) output with engine running. CT could explode if disconnected from load with engine running. Do not disconnect CT with generator rotating. Failure to comply can cause serious injury or death to personnel.

TROUBLESHOOTING USING MAINTENANCE SUPPORT DEVICE (MSD) AND ELECTRONIC TECHNICIAN (ET) TOOL

The MSD is a military laptop computer that interfaces with the TQG via a Caterpillar Communications Adapter that is connected to the engine wire harness and the GSC.

NOTE

The MSD must be configured to interface the GSC/ECM.

Software for Caterpillar Communication Adapter II should be preloaded into MSD. Refer to Caterpillar Service Tool Hardware and Software/User's Manual Communication Adapter II, Ver 1.93 (1.9-B4) and CD NEHS0758.

To configure MSD to interface GSC/ECM, perform the following procedure:

STEP 1. On the EMCP, set ENGINE CONTROL switch to OFF/RESET. Set the Battery Disconnect Switch to OFF. Set the DEAD CRANK SWITCH to OFF.

STEP 2. Connect data link cable between ECM to Electronic Modular Control Panel (EMCP) harness connector CDC-P7 and communications adapter.

STEP 3. Connect serial PC cable to MSD COMM1 port. Connect power to the PC.

STEP 4. Start and operate TQG per TM 9-6115-730-10.

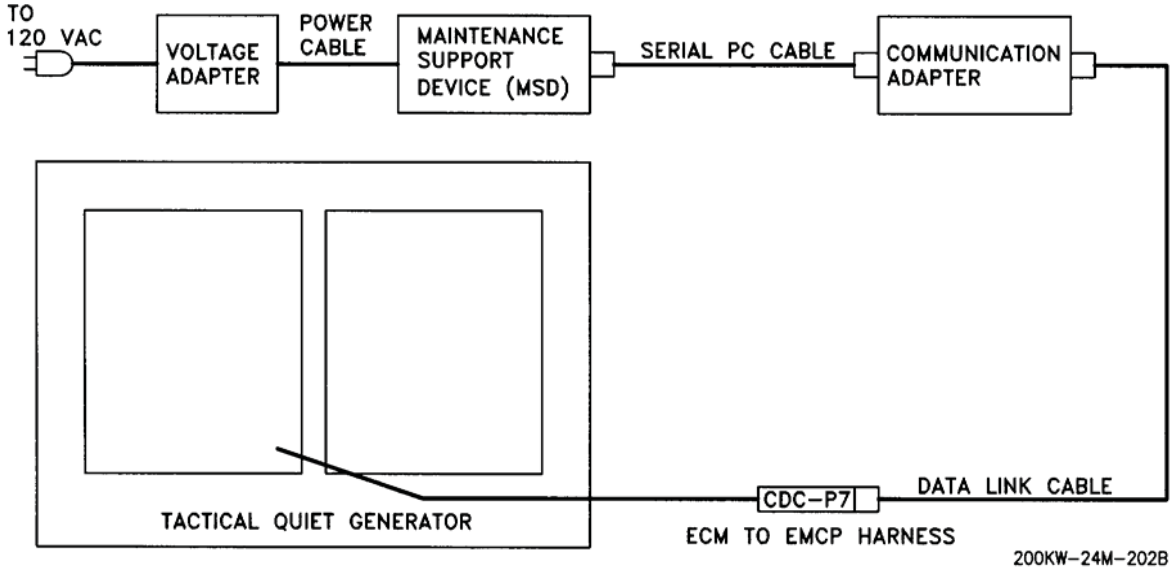

Figure 1. Connecting Caterpillar Communication Adapter.

TROUBLESHOOTING USING MAINTENANCE SUPPORT DEVICE (MSD) AND ELECTRONIC TECHNICIAN (ET) TOOL - Continued

NOTE

Software for Caterpillar Communication Adapter II should be preloaded into MSD. Refer to Caterpillar Service Tool Hardware and Software/User's Manual Communication Adapter II, Ver 1.93 (1.9-B4) and CD NEHS0758.

STEP 5. Press POWER switch on MSD and load CD ROM disc.

STEP 6. Select D:\ drive and open CD ROM disc.

END OF TASK

LOADING ELECTRONIC TECHNICIAN (ET) SOFTWARE

When you are directed to use Caterpillar proprietary Electronic Technician (ET) software from Unit (Field Level) maintenance troubleshooting, you must load ET software into the MSD. The ET Getting Started Manual will be on the CD ROM with the Communications Adapter interface software as ET 2002B Getting Started.pdf. There should be no licensing or registration requirements while loading the Cat ET software/program.

STEP 1. Open **Getting Started.pdf** document on the CD ROM.

STEP 2. Install ET Caterpillar software media # EERE3500 as instructed in Caterpillar Service Tool Software/Getting Started Manual.

STEP 3. For all other information pertaining to operation, troubleshooting, and transferring to another computer, consult **Caterpillar Service Tool Software/Getting Started Manual** contained on the CD ROM.

Caterpillar Electronic Service Tools are designed to help the service technician:

a. Obtain data.

b. Diagnose problems.

c. Read parameters.

d. Program parameters.

e. Calibrate sensors.

END OF TASK

USING ELECTRONIC TECHNICIAN (ET) SOFTWARE

The basic Caterpillar ET operations are addressed in the instructions that follow. Figure 2 shows the Caterpillar ET opening screen and Table 1 shows the primary navigation icons and their uses.

STEP 1. Select the **Electronic Technician** icon on the desktop of the MSD computer being used or select the Electronic Technician program under **Start/Programs/Caterpillar ET**.

STEP 2. If a message This program is not licensed. License the program now? appears, select YES and follow the on screen instructions or follow steps 4 through 12 in the previous section titled TROUBLESHOOTING USING ELECTRONIC TECHNICIAN (ET).

STEP 3. On the ET screen, select the **Connect** icon (Table 1).

a. If the ET cannot communicate (CONNECT) with the ECM, check the ET communication settings by selecting **Utilities** pull down menu, select **Preferences**. For communications with the Caterpillar Communication Adapter II, **COM 1** should be selected. Click on **Advanced** button. The baud rate should be 57600.

b. Click OK to close the **Baud Rate** window. Click OK to close the **Preferences** window. Select the **Connect** icon again.

STEP 4. At menu selection, choose the **C-12 Industrial Engine**.

STEP 5. After communications connection is established, the **ECM Summary window** is displayed. All of the top tool bar ICONS (Table 1) should now be available.

STEP 6. Select Active Diagnostics Codes by clicking on the **Active Diagnostics Codes** icon or click on the pull down menu for **Diagnostics** and selecting **Active Diag. Codes**.

a. The codes listed in the Active Diagnostics Code list are shown with the top priority code from the top down. The first code shown is the most important and must be corrected first.

b. If other GSC codes have brought you to this ET screen for troubleshooting a problem, the top priority Active Diagnostic Code problems must be corrected first.

STEP 7. Select Logged Diagnostic Codes by clicking on the **Logged Diagnostic Codes** icon or click on the pull down menu for **Diagnostics** and selecting **Logged Diag. Codes**.

a. The codes listed in the Logged Diagnostics Code list are shown with the top priority code from the top down. The first code shown is the most important and must be corrected first. These codes are the same as the Active Diagnostic Codes except they are logged over time.

b. To CLEAR any or all of the Logged Diagnostic Codes, click on a Logged Diagnostic Code in the list to highlight it. Click on the CLEAR button in the lower left corner of the page.

(1) A pop up window appears with the message Are you sure you want to clear the code?

(2) Click on the YES button to clear the code from the list.

USING ELECTRONIC TECHNICIAN (ET) SOFTWARE - Continued

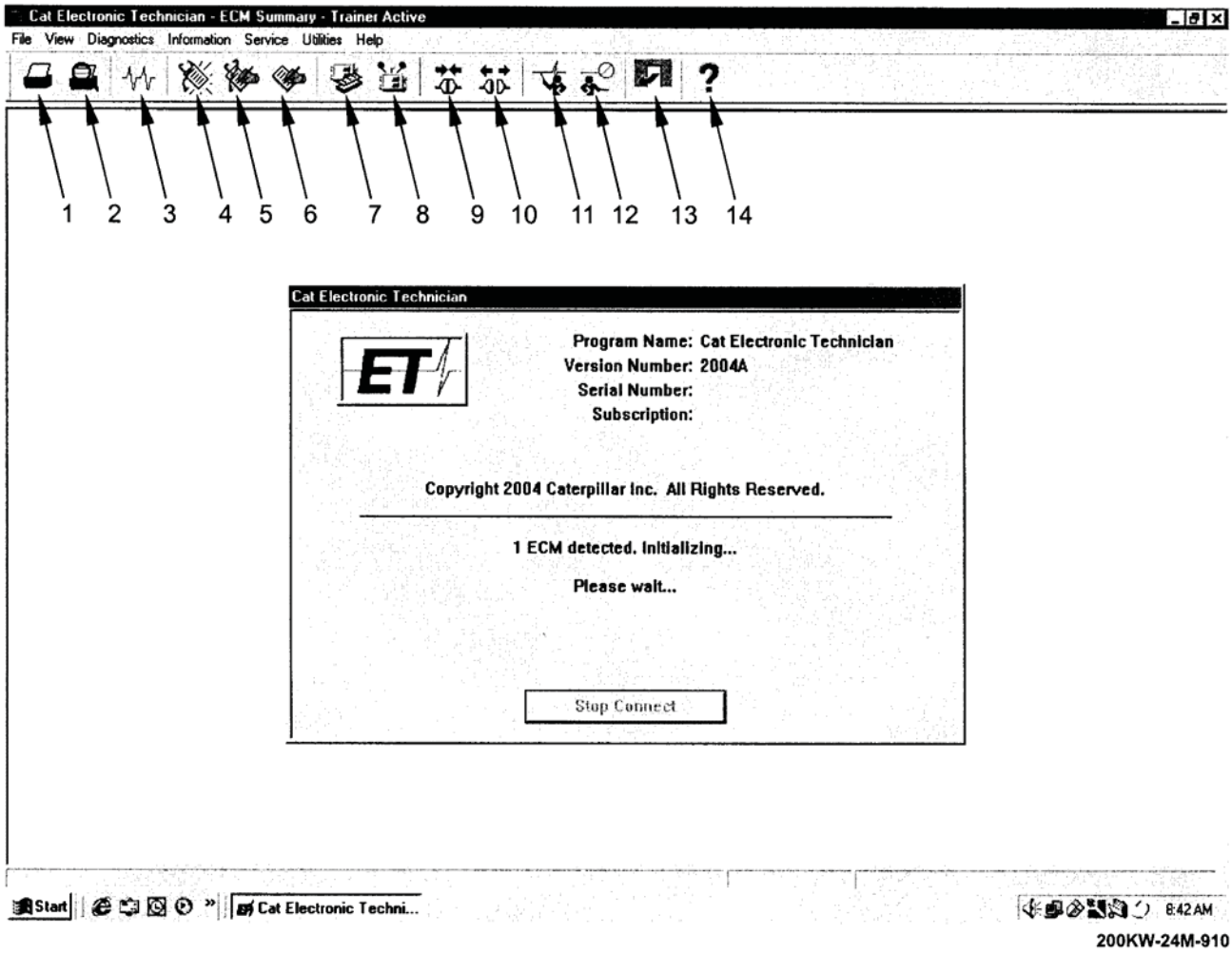
Cat Electronic Technician - ECM Summary - Trainer Active
File View Diagnostics Information Service Utilities Help
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Cat Electronic Technician
Program Name: Cat Electronic Technician
Version Number: 2004A
Serial Number:
Subscription:
Copyright 2004 Caterpillar Inc. All Rights Reserved.
1 ECM detected. Initializing...
Please wait...
Stop Connect
Start
Cat Electronic Techni...
8:42 AM
200KW-24M-910

Figure 2. Caterpillar ET Opening Screen.

USING ELECTRONIC TECHNICIAN (ET) SOFTWARE - Continued

Table 1. Caterpillar ET Tool Navigation Icons.

ITEM	ICON	USE OF ICON
1		Print: Prints selected data or log.
2		Print Preview: Displays preview of data to be printed.
3		Status Tool: Opens Status Tool that allows observation of specific engine parameters and operating conditions.
4		Active Diagnostics Codes: Displays Active Diagnostic Codes.
5		Logged Diagnostics Codes: Displays historical log of Diagnostic Codes for analysis and evaluation.
6		Logged Event Codes: Displays historical log of engine event codes.
7		ECM Summary: Summarizes ECM information including engine ID and serial number along with ECM serial number and personality module identification.
8		Configuration Tool: Allows configuration of ECM.
9		Connect: Connects ET tool to engine and establishes communication to ECM.
10		Disconnect: Disconnects ET tool from engine.
11		Enable Trainer: Enables training mode for ET tool familiarization.
12		Disable Trainer: Disables training mode for ET tool familiarization.
13		Exit: Exits ET tool software.
14		Display help contents: Displays software help index and guidance.

200KW-24M-911

USING ELECTRONIC TECHNICIAN (ET) SOFTWARE - Continued

STEP 8. To run the Diagnostic Tests, click on the pull down menu for **Diagnostics**, then select **Diagnostic Tests** (Figure 3).

a. The Diagnostics Tests can run the following tests:

(1) Injector Solenoid Test

(2) Ether Injection System Test

(3) Override Parameters

(4) Cylinder Cutout Test

(5) Wiggle Test

b. Select the test called out in the troubleshooting work package and follow the on screen instructions.

USING ELECTRONIC TECHNICIAN (ET) SOFTWARE - Continued

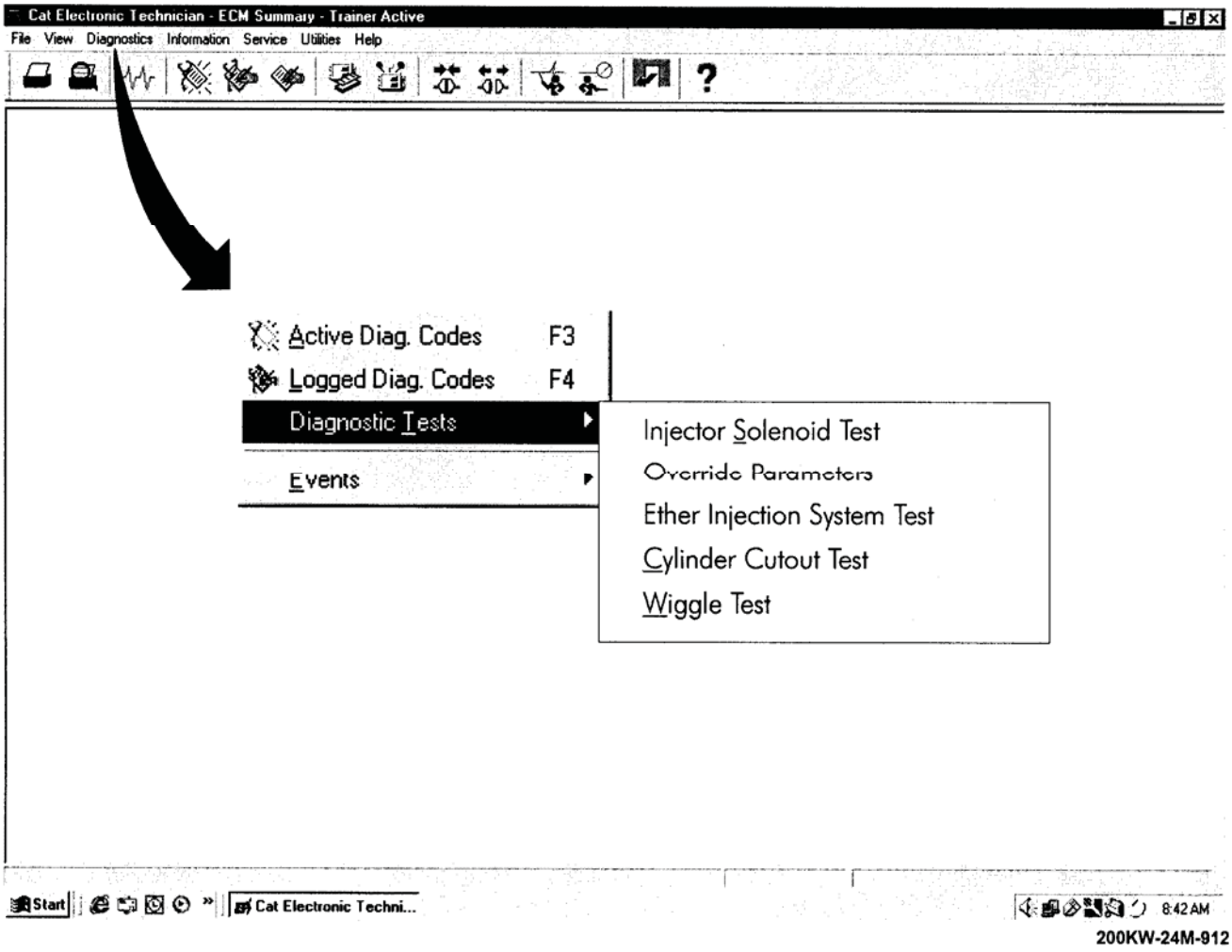

Figure 3. Cat ET Diagnostic Tests.

END OF TASK

END OF WORK PACKAGE

FIELD LEVEL TROUBLESHOOTING
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING

INITIAL SETUP:

Tools and Special Tools

146-4080 Digital Multimeter or Equivalent
Caterpillar Electronic Technician (Cat ET)
Software Media # NEXG5039 and # JEBD3003
EERE3500 Cat ET for Military 100 and 200 TQG
171-4400 Comm. Adapter II Group or Equivalent
4C-4911 Battery Load Tester or Equivalent

Materials/Parts

18 gauge wire per M22759/16-18-9
88-21943 contacts
Engine oil, 2D-6392

References

WP 0083
WP 0088
FO-2
FO-4

Personnel Required

One

ELECTRONIC TECHNICIAN (FIELD) LEVEL TROUBLESHOOTING

NOTE

100/200 kW TQG Cat ET software/program is for use on the 100/200 kW TQGs only. Loading 100/200 kW TQG Cat ET software will overwrite existing Cat ET software/program. If commercial Cat ET software is to be reinstalled, record the licensing data prior to installing 100/200 kW TQG Cat ET software/program. The licensing data must be reloaded when reinstalling the original (previous) Cat ET software/program.

WARNING

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

ELECTRONIC TECHNICIAN (FIELD) LEVEL TROUBLESHOOTING - Continued

Field Level Troubleshooting for the Tactical Quiet Generator uses the Caterpillar Electronic Technician (ET) software and the Caterpillar Communication Adapter Group as described in WP 0012. References to Caterpillar ET are included in other sections of the Field level troubleshooting procedures. All other Field level troubleshooting should be performed before progressing to the ELECTRONIC TECHNICIAN procedures.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING

SYMPTOM

1. Electrical Connectors Wiggle Test.

System Operation Description:

Most electrical problems are caused by poor connections. The following procedure will assist in detecting problems with connectors and with wiring. If a problem is found correct the condition and verify that the problem is resolved.

Intermittent electrical problems are sometimes resolved by disconnecting and reconnecting connectors. It is very important to check for diagnostic codes immediately before disconnecting a connector. Also check for diagnostic codes after reconnecting the connector. If the status of a diagnostic code is changed due to disconnecting and reconnecting a connector, there are several possible reasons. The likely reasons are loose terminals, improperly crimped terminals, moisture, corrosion, and inadequate mating of a connection.

NOTE

Perform the following test only after completing the tests in WP 0088.

MALFUNCTION

Electrical voltage or signal intermittent/erratic.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Connect the Cat ET to connector CDC-P7 (WP 0012).

STEP 3. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 4. Perform the Wiggle Test on the Cat ET.

a. Select the Wiggle Test from the Diagnostic Tests on Cat ET.

b. Choose the appropriate group of parameters to monitor.

c. Press the Start button for the Wiggle Test. Wiggle the wiring harness in order to reproduce intermittent problems. If an intermittent problem exists, the status will be highlighted and an audible beep will be heard.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

d. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

(1) If no intermittent problems were indicated during the Wiggle Test, the harness and connectors appear to be OK. If you were sent from another procedure, return to the procedure and continue testing. If this test has resolved the problem, return the engine to service.

(2) If at least one intermittent problem was indicated, repair the harness or the connector (WP 0088).

(3) Verify that the repair eliminates the problem.

SYMPTOM

2. Electrical Power Supply Circuit Test.

System Operation Description:

Use this procedure and Figure 1 to troubleshoot any suspect problems with the electrical supply to the engine's Electronic Control Module (ECM). This procedure covers the following diagnostic code:

- 168-02 System voltage intermittent/erratic
- 168-03 System voltage above normal
- 168-04 System voltage below normal

A signal from the ENGINE CONTROL switch (ESC) is provided to generator set control (GSC) interface to the ECM and tells the ECM the position of the ECS. When the ECM senses battery voltage to the GSC interface to the ECM, the ECM will power up. The GSC receives battery voltage when the ECS is in the AUTO, MANUAL START or COOL DOWN/STOP positions. If the voltage is removed from the GSC, the ECM will power down. Cycling power to the GSC interface to the ECM will reset the ECM. The electrical power for the engine comes through the CB4 circuit breaker and the slave relay to the battery terminals on the ECM. The presence of three +battery connections and three battery connections to the ECM reduces harness resistance. All of these connections must be complete in order to ensure proper engine operation. Figure 1 shows the electrical power supply circuit.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

SYMPTOM - Continued

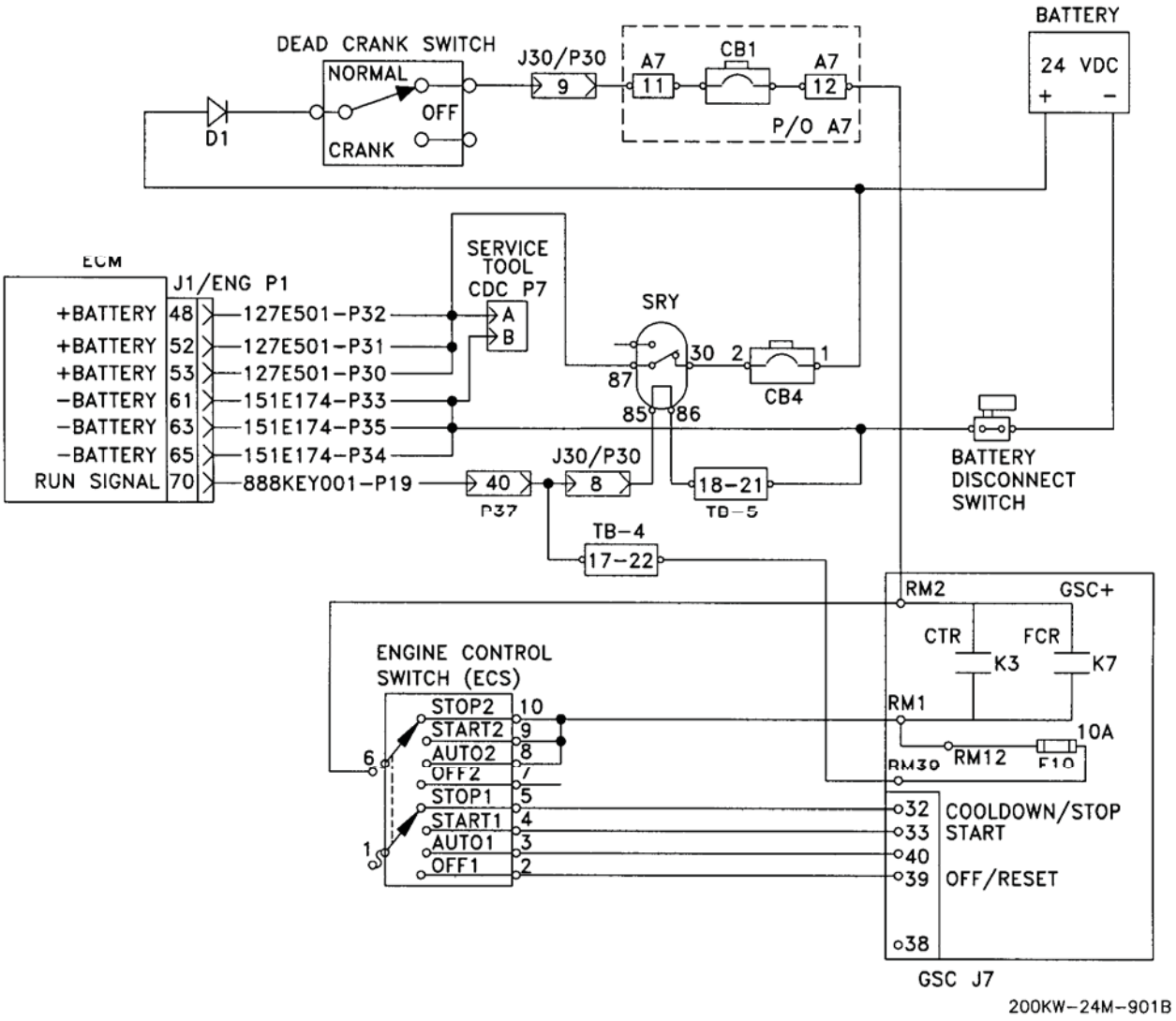

Figure 1. 24 Vdc Electrical Circuits.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

MALFUNCTION

168-02 code. Electrical system voltage intermittent/erratic.

168-03 code. Electrical system voltage above normal.

168-04 code. Electrical system voltage below normal.

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Check the battery voltage.

a. Measure the open circuit voltage at the battery terminals.

b. Load test the batteries (WP 0050). Use the 4C-4911 battery load tester or equivalent.

(1) If the no-load voltage at the batteries is at least 24 ± 1 Vdc, and the batteries pass the load test. Proceed to STEP 3.

(2) If the battery voltage is incorrect and/or the battery fails the load test, the batteries or the alternator are causing the problem. Recharge the batteries or replace the batteries (WP 0050). Verify that the original condition is resolved.

STEP 3. Check the voltage to the ECM.

a. Remove ECM connector ENG-P1.

b. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP.

c. Measure the voltage between ENG-P1-48 and ENG-P1-61.

d. Measure the voltage between ENG-P1-52 and ENG-P1-63.

e. Measure the voltage between ENG-P1-53 and ENG-P1-65.

f. Measure the voltage between ENG-P1-70 and ENG-P1-65.

g. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

h. Reconnect ECM connector ENG-P1.

(1) If the voltage measured at STEPS 3c., 3d., 3e., and 3f. is 24 ± 3 Vdc. The ECM is receiving the correct voltage.

(2) On the ECM inputs from the ENGINE CONTROL switch, if the voltage is not 24 ± 3 Vdc. Proceed to STEP 4.

(3) If the voltage is not 24 ± 3 Vdc at the +battery terminals on ECM connector P1, proceed to STEP 5.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

CORRECTIVE ACTION - Continued

STEP 4. Check the voltage inputs to ENGINE CONTROL switch and to ECM.

a. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP.

b. Check the voltage between engine ground and the test points in Table 1. If voltage is not present at a test point, the problem is in the device, in the wire or in the connector that precedes the point in the circuit. Refer to Figure 1 and FO-1, Sheet 2 as required).

(1) If the voltage is 24 ± 3 Vdc at all test points, the wire 800KEY001-P19-T between ECM connector ENG-P1-70 and connector ENG-P37 is defective. Repair wire 800KEY001-P19-T and/or connections between connector ENG-P37 and ECM connector ENG-P1-70 (WP 0088).

(2) If the voltage is not 24 ± 3 Vdc at a test point, repair the device, connectors and/or wiring (WP 0041, WP 0042, WP 0043, WP 0088, FO-2, sheet 2; FO-4, sheets 1-4).

c. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

Table 1. ECM Supply Voltage Test Points.

DEVICE (Figure 1)	TERMINAL
Diode D1	Either side
DEAD CRANK SWITCH	Terminals for NORMAL crank
J30/P30 connector	9
Resistor Assembly A7	11
Resistor Assembly A7	12
GSC	RM2
ENGINE CONTROL switch	6
ENGINE CONTROL switch	10
GSC	RM1
GSC	RM39
TB-4	17-22
Connector ENG-P37	40

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

CORRECTIVE ACTION - Continued

STEP 5. Check the voltage to the + battery Inputs of the ECM.

a. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP.

b. Check the voltage between engine ground and the test points in Table 2. If voltage is not present at a test point, the problem is in the device, in the wire or in the connector that precedes the point in the circuit. Refer to Figure 3, FO-2, sheet 2; and FO-4, sheets 1-4.

(1) If voltage is present on terminal 87 of the slave relay (SRY) but not present at the ECM, repair the wires between the ECM and the SRY (WP 0088; FO-3, sheet 1).

(2) If the voltage is not 24 ± 3 Vdc at a test point, check that voltage is present at terminal 85 and terminal 30 of SRY and voltage is not present on terminal 87 of SRY, verify that the wire from terminal 86 of SRY has continuity to the battery. If the wire from terminal 86 of the SRY has continuity to the battery, replace SRY (WP 0055). Repair the device, connectors and/or wiring.

Table 2. + Battery Voltage Input to ECM Test Points.

DEVICE	TERMINAL
J30/P30 connector	8
Slave relay (SRY)	85
Circuit breaker CB4	1
Circuit breaker CB4	2
SRY	30
SRY	87

c. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

(1) If voltage is present on terminal 87 of SRY but not present at the ECM, repair the wires between the ECM and the slave relay (SRY) (WP 0088, FO-3, sheet 1)).

(2) If the voltage is not 24 ± 3 Vdc at a test point, check that voltage is present at terminal 85 and terminal 30 of SRY and voltage is not present on terminal 87 of SRY, verify that the wire from terminal 86 of SRY has continuity to the battery. If the wire from terminal 86 of SRY has continuity to the battery, replace SRY (WP 0055). Repair the device, connectors and/or wiring (WP 0041, WP 0042, WP 0043, WP 0088, FO-2, Sheet 2; FO-4, Sheets 1-4).

d. Verify the problem has been resolved.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

SYMPTOM

3. Engine Timing Sensor Circuit Test.

System Operation Description:

NOTE

The camshaft (top) engine timing sensor functions as the backup in the event the crankshaft (bottom) engine timing sensor fails.

Use this procedure and Figure 2 to troubleshoot any suspect problems with the following sensors:

- Primary (crankshaft/bottom) engine timing sensor
- Secondary (camshaft/top) engine timing sensor

This procedure covers the following diagnostic codes:

- 190-E-02 Loss of Engine Speed Signal
- 190-E-11 Engine Speed Sensor mechanical failure
- 342-E-02 Loss of Secondary Engine Speed signal
- 342-E-11 Secondary Engine Speed Sensor mechanical failure

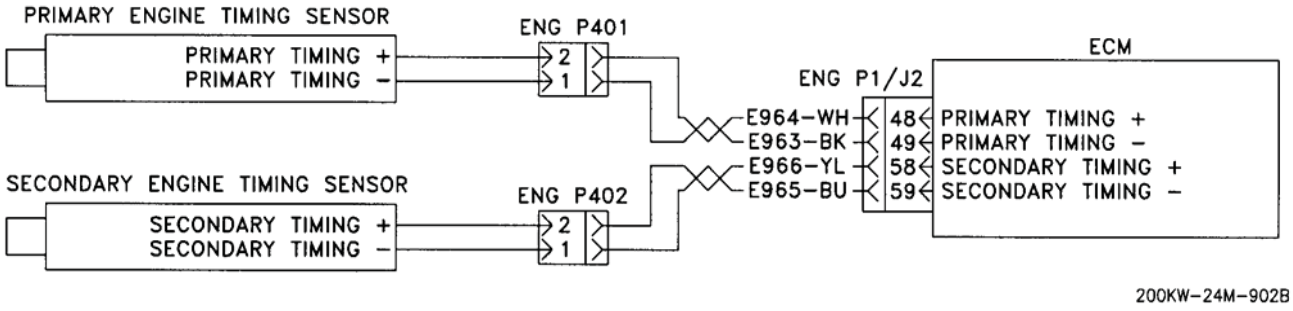

Figure 2. Engine Timing Circuit.

MALFUNCTION

Engine Timing Sensor. Erratic, Intermittent, or Incorrect Signal.

Engine Timing Sensor. Failure mode not identifiable (Mechanical Failure).

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Connect the Cat ET to connector CDC-P7 (WP 0012).

STEP 3. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 4. Turn the ENGINE CONTROL switch to MANUAL START.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

CORRECTIVE ACTION - Continued

NOTE

If the engine will not start, monitor the engine rpm on the Cat ET while the engine is being cranked. The Cat ET may need to be powered from another battery while the engine is being cranked.

STEP 5. Wait at least 30 seconds for activation of the diagnostic codes. Look for these codes on the Cat ET:

- 190-E-02
- 190-E-11
- 342-E-02
- 342-E-11

a. If code 190-E-02 is active, refer to WP 0009, SYMPTOM 25, CID 190-E-02.

b. If code 342-E-02 is active, refer to WP 0009, SYMPTOM 39, CID 342-E-02.

c. If codes 190-E-11 and/or 342-E-11 are active, proceed to STEP 6.

NOTE

If the engine will not start and the Cat ET displayed 0 rpm during cranking, select No Engine rpm.

STEP 6. If Engine rpm is not indicated on the Cat ET, check the installation of the sensor (Figure 3).

a. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

b. Visually inspect the sensor assemblies (Figure 3) without removing the sensor assemblies from the engine. Flanges of crankshaft timing sensor (Figure 3, Item 1) and camshaft timing sensor (Figure 3, Item 2) must be flush against engine in order to ensure proper operation.

c. Inspect brackets (Figure 3, Item 3). Verify that the brackets securely hold the flanges of the sensors flush against the engine. Verify that the brackets are not bent. If the bracket is bent or if an obstruction is preventing the sensor assembly from being installed correctly, the engine will not start.

NOTE

The bracket cannot be replaced separately.

d. Disconnect connector ENG P401 from the crankshaft engine timing (bottom) sensor. Disconnect connector ENG P402 from the camshaft engine timing (top) sensor. Remove bolt (Figure 5, Item 4) and washer (Figure 5, Item 5) and remove the sensor assembly (Figure 5, Item 1 or Item 2) from the engine.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

CORRECTIVE ACTION - Continued

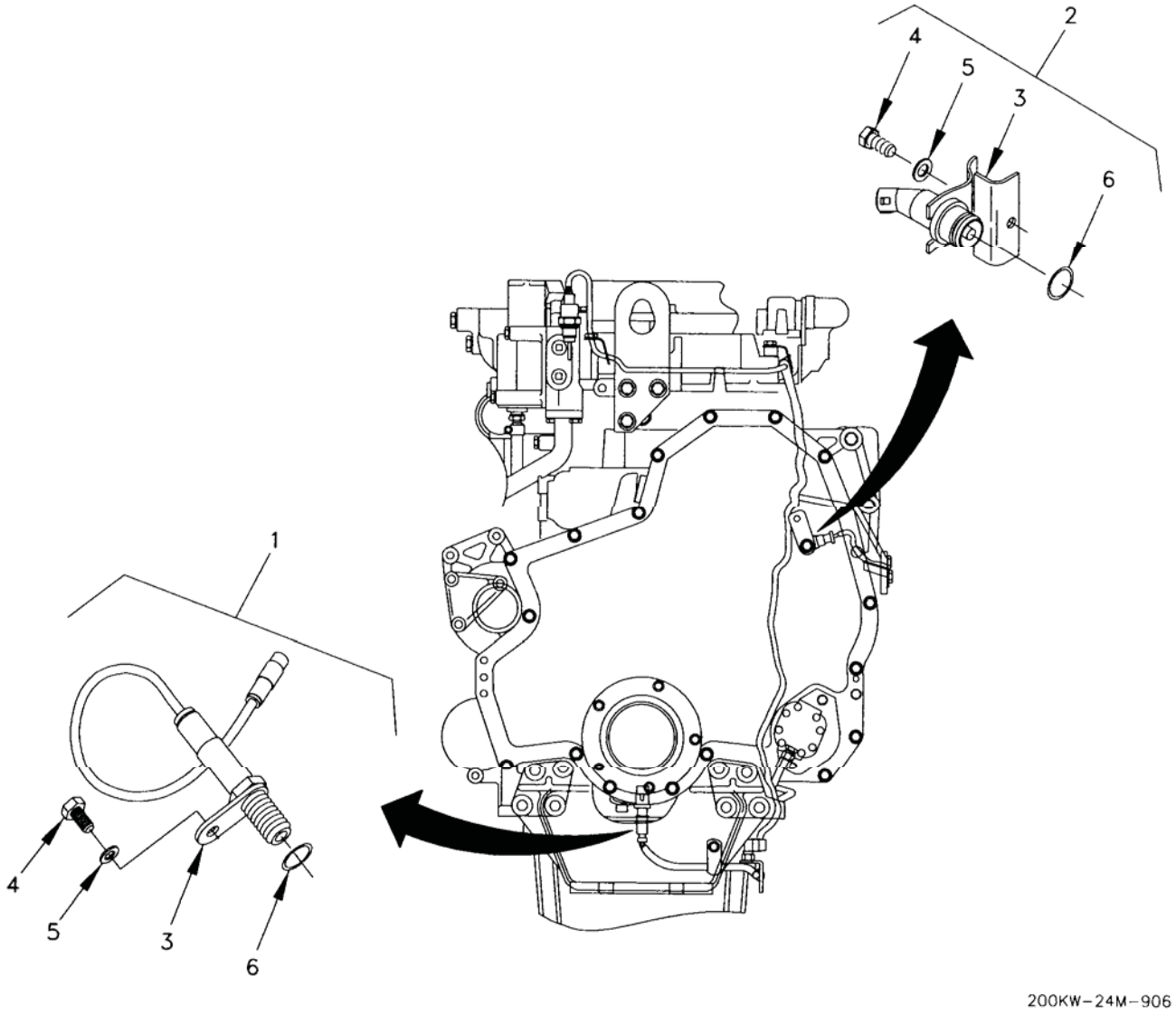

Figure 3. Timing Sensors.

e. Ensure that one O-ring (Figure 3, Item 6) is installed on each sensor. Check the O-rings for damage. Replace the O-rings, if necessary.

f. If the sensors appear undamaged, perform the following steps.

(1) Lubricate each O-ring ring (Figure 3, Item 6) with clean engine oil.

(2) Fully seat the sensor assembly (Figure 3, Item 1 or Item 2) in the engine.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

CORRECTIVE ACTION - Continued

NOTE

If the sensor assembly will not fully seat into the engine, replace the sensor assembly.

(3) Install the bracket bolt (Figure 3, Item 4) and washer (Figure 3, Item 5) with bracket. Tighten the bracket bolt.

(4) Connect the sensor electrical connectors (ENG P401 to the crankshaft (bottom) engine timing sensor and ENG P402 to the camshaft (top) engine timing sensor (FO-2, Sheet 2). Verify that the connectors are latched on both sides.

(5) Ensure that the harness is properly secured, and that the tie-wraps are placed in the correct location. Proceed to STEP 7.

g. If one or both of the sensors are damaged, perform the following steps.

(1) Obtain a new sensor assembly.

(2) Lubricate each O-ring ring (Figure 3, Item 6) with clean engine oil.

(3) Fully seat the sensor assembly in the engine. Install the bracket bolt (Figure 3, Item 4) and washer (Figure 3, Item 5) with bracket.

(4) Tighten the bracket bolt. If the sensor assembly will not fully seat into the engine, inspect the bracket for damage. Replace the sensor assembly with an undamaged assembly, if necessary.

(5) Connect the sensor electrical connectors (ENG P401 to the crankshaft (bottom) engine timing sensor and ENG P402 to the camshaft (top) engine timing sensor (FO-2, Sheet 2). Verify that the connectors are latched on both sides.

(6) Ensure that the harness is properly secured, and that the tie-wraps are placed in the correct location. Retest and verify that the problem is resolved. Perform Engine Timing Sensor Calibration (WP 0013, SYMPTOM 8). If the problem is not resolved, proceed to STEP 7.

STEP 7. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 8. Turn the ENGINE CONTROL switch to MANUAL START.

If the engine still will not start and the Cat ET displayed 0 rpm during cranking perform the following steps.

a. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

b. Install a replacement ECM (WP 0082).

c. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP.

d. Turn the ENGINE CONTROL switch to MANUAL START. Verify the problem is resolved. Perform Engine Timing Sensor Calibration (WP 0013, SYMPTOM 8).

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

SYMPTOM

4. Ether Injection System Test.

System Operation Description:

Use this procedure to troubleshoot any suspect problems with the Ether System.

This procedure covers the following diagnostic codes:

- 545-E-05 Ether Start Relay open/short to +batt
- 545-E-06 Ether Start Relay short to ground

The ether injection system (Figure 4) will improve cold weather starting of the engine. The engine's Electronic Control Module (ECM) controls the ether injection system. The ether injection system is disabled if there is an active engine shutdown. The ECM energizes the ether relay for a predetermined amount of time that is based on the coolant temperature and the inlet manifold air temperature.

The ether injection system is enabled when all of the following conditions occur:

- Ether is enabled in the system configuration parameters.
- Engine speed is less than 35 rpm.
- Coolant temperature or Inlet Manifold air temperature is less than 0°C (32°F).

A test on the Caterpillar Electronic Technician (ET) allows the technician to activate the ether system. The test is functional when the engine speed is 0 rpm. The test can be activated by selecting the Override Parameters screen on Cat ET.

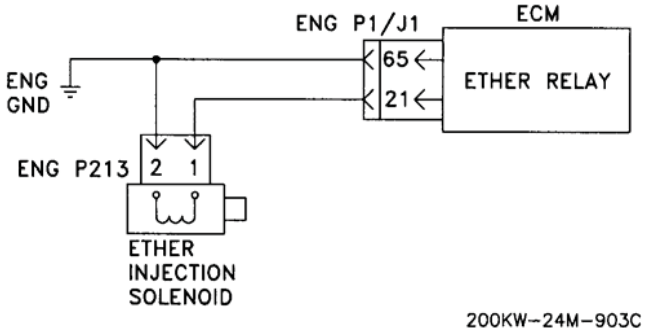

Figure 4. Ether Injection System Circuit.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

MALFUNCTION

Current is below normal or circuit is open.

Current is above normal or circuit is grounded.

CORRECTIVE ACTION

CAUTION

The Ether Canister must be removed prior to activating this test.

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Connect the Cat ET to connector CDC-P7 (WP 0012).

STEP 3. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP.

a. Proceed to the Diagnostic Overrides screen on the Cat ET.

b. Activate the Ether Injection System. The Diagnostic Override will activate for ten seconds.

c. Monitor the active diagnostic code screen on the Cat ET. Check and record any active diagnostic codes.

d. If no diagnostic codes are active, and the ether system injected ether. The problem may be intermittent. If the problem is intermittent, refer to WP 0088 and, Electrical Connectors Wiggle Test (WP 0013, SYMPTOM 1) for information on connectors and wiring.

STEP 4. Ensure the Battery Disconnect Switch is not turned OFF.

STEP 5. Check for 24 Vdc on the ether relay terminal connected to the battery. If not present, repair or replace the wire, as necessary (WP 0088). Verify the problem has been resolved. If not, continue to the next step.

a. Locate the terminal with the wire connecting to the ether solenoid.

b. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP.

c. Proceed to the Diagnostic Overrides screen on the Cat ET.

d. Activate the Ether Injection System. The diagnostic override will activate for ten seconds.

e. Measure 24 Vdc on the ether relay terminal connecting the wire to the ether solenoid. If not, the ether relay is not operating. Proceed to STEP 6. If OK, continue to the next step.

f. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

g. Verify continuity from the terminal on the ether solenoid to the ether relay. Repair or replace if necessary (WP 0088). Verify the problem has been resolved. If not, continue to the next step.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

CORRECTIVE ACTION - Continued

h. Verify continuity from the other terminal on the ether solenoid to the Battery Disconnect Switch, ENG-P213-2, and engine ground. Repair or replace if necessary (WP 0088). Verify the problem has been resolved. If not, continue to the next step.

i. If all continuity measurements are good and the problem has not been resolved, replace the ether solenoid (WP 0073). Verify the problem has been resolved. If not, continue to the next step.

STEP 6. Disconnect ENG-P213 from the ether relay (FO-2 Sheet 2).

a. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP.

b. Proceed to the Diagnostic Overrides screen on the Cat ET.

c. Activate the Ether Injection System. The diagnostic override will activate for ten seconds.

d. Monitor the Active Diagnostic Codes screen on the Cat ET.

e. Check for an active 05 diagnostic code for the ether circuit.

STEP 7. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

a. Connect a jumper wire between ENG-P213-1 and ENG-P213-2.

b. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP.

c. Proceed to the Diagnostic Overrides screen on the Cat ET.

d. Activate the Ether Injection System. The diagnostic override will activate for ten seconds.

e. Monitor the Active Diagnostic Codes screen on the Cat ET.

f. Check for an active 06 diagnostic code for the ether circuit.

g. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF. Remove the wire jumper.

(1) If a 06 diagnostic code was active when the jumper wire is installed and a 05 diagnostic code was active when the jumper wire is removed, the engine harness and the ECM are OK.

(2) If the diagnostic codes do not change as stated above, verify continuity between ENG-P213-1 and ENG-P1-21. Repair as necessary (WP 0088). Verify the problem has been resolved. If not, replace the ether relay (WP 0073).

(3) Verify the problem has been resolved. If not, replace the ECM (WP 0082).

(4) Verify the problem has been resolved.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

SYMPTOM

5. Injector Solenoid Circuit Test.

System Operation Description:

- An injector solenoid may have a problem.
- You have been directed to this procedure from WP 0011, Troubleshooting without a Diagnostic Code.
- There is an active diagnostic code for an injector solenoid.

Use this procedure for the following diagnostic codes:

- 1-E-11 Injector Cylinder 1 fault
- 2-E-11 Injector Cylinder 2 fault
- 3-E-11 Injector Cylinder 3 fault
- 4-E-11 Injector Cylinder 4 fault
- 5-E-11 Injector Cylinder 5 fault
- 6-E-11 Injector Cylinder 6 fault

Figure 5 shows the injector solenoid circuit. Perform the troubleshooting procedures under conditions that are identical to the conditions that exist when the problem occurs. Typically, problems with the injector solenoid occur when the engine is warmed up and/or when the engine is under vibration (heavy loads). These engines have hydraulically actuated electronically controlled unit injectors (HEUI). The ENGINE CONTROL Module (ECM) sends a 105 volt pulse to each injector solenoid. The pulse is sent at the proper time and at the correct duration for a given engine load and speed. The solenoid is mounted on top of the fuel injector body. If an open is detected in the solenoid circuit, a diagnostic code is generated. The ECM continues to try to fire the injector. If a short is detected, a diagnostic code is generated. The ECM will disable the solenoid circuit. The ECM will periodically try to fire the injector. If the short circuit remains, this sequence of events will be repeated until the problem is corrected. When an injector is replaced, program the new injector code into the ECM. If the ECM is replaced, all six injector codes must be programmed into the new ECM. Refer to Troubleshooting, Replacing the ECM for the correct procedure. The Caterpillar Electronic Technician (ET) includes the following tests that aid in troubleshooting the injector solenoids.

NOTE

Before running the Cylinder Cutout Test, all active diagnostic codes must be repaired.

Cylinder Cutout Test

The Cylinder Cutout Test is used on an engine in order to determine the individual cylinder performance while the engine is running. As one or more cylinders are cut out during the test, the Cylinder Cutout Test uses the fuel position of each injector in order to evaluate the performance of the remaining cylinders that are firing. As the different cylinders are cut out, a comparison of the change in fuel position is used to identify cylinders that are weak or misfiring. One reason for a cylinder that is weak or misfiring is an injector that is malfunctioning mechanically. During the test, when a good injector is cut out, the fuel position of the remaining injectors will show a consistent change. This consistent change in the fuel position is caused by the remaining injectors that are compensating for the cut out injector. If a malfunctioning injector is cut out, the fuel position will not show a proportional change. This unbalanced change is the result of the smaller quantity of fuel that is needed to compensate for the power loss from the malfunctioning injector. The Cylinder Cutout Test is used to isolate a malfunctioning injector in order to avoid replacement of injectors that are in good repair.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

Injector Solenoid Test

Use the Injector Solenoid Test and Figure 5 to aid in diagnosing an open circuit or a short circuit while the engine is not running. The Injector Solenoid Test briefly activates each solenoid. A good solenoid will create an audible click when the solenoid is activated. The Cat ET will indicate the status of the solenoid as OK, Open, or Short.

NOTE

Two injector solenoids share a common return wire (FO-2, sheet 2). For this reason, an open circuit or a short circuit in a return wire could cause diagnostic codes for two injector solenoids.

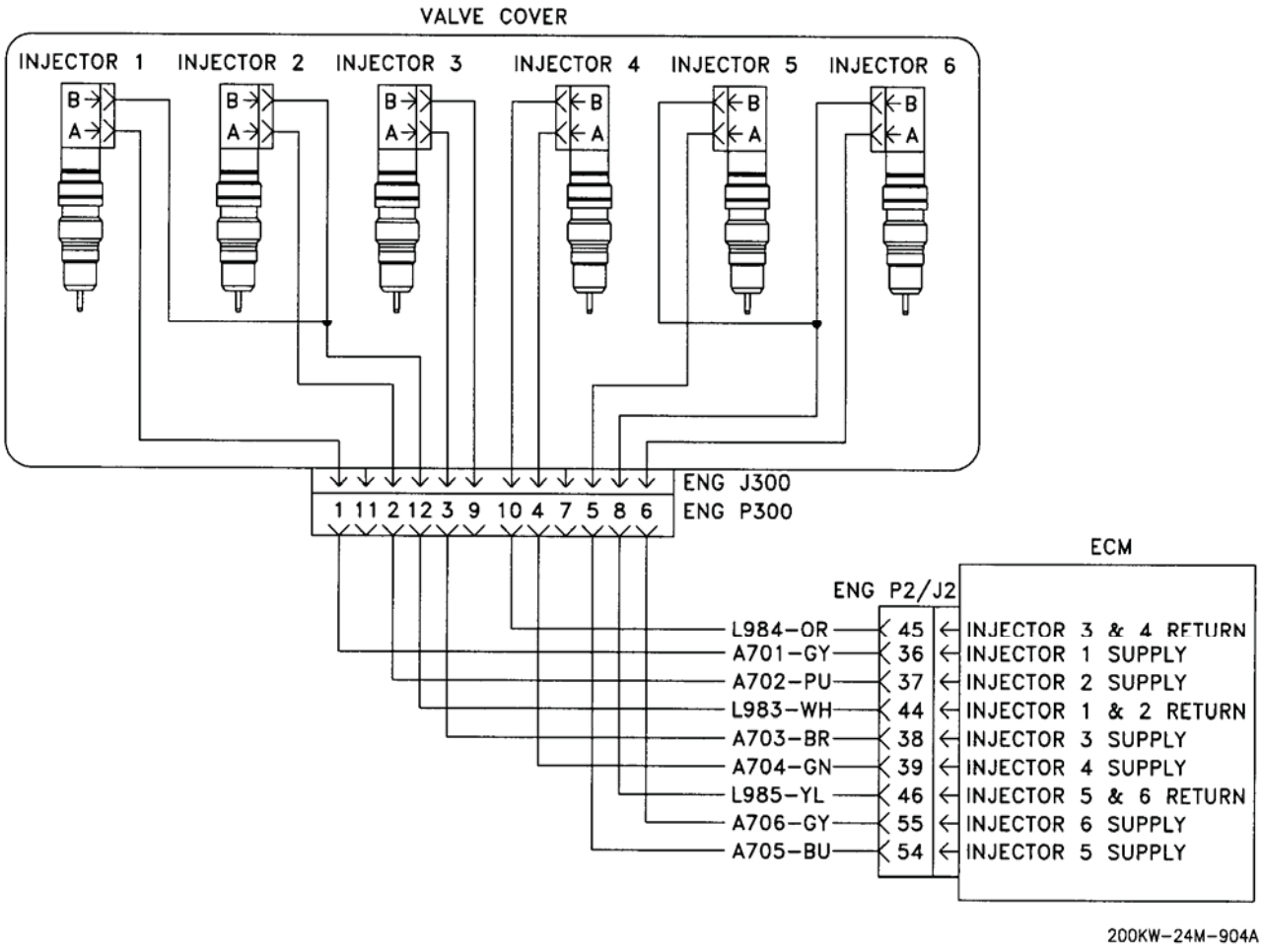

Figure 5. Injector Solenoid Circuit.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

MALFUNCTION

Cylinder 1 - 6 Injector Solenoids. Failure mode is not identifiable (Mechanical Failure).

CORRECTIVE ACTION

STEP 1. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 3. Connect the Cat ET to Connector CDC-P7 (WP 0012).

STEP 4. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 5. Monitor the logged diagnostic code screen on the Cat ET. Look for a FMI 11 code that is related to one of the unit injectors.

STEP 6. Turn the ENGINE CONTROL switch to MANUAL START. Allow the engine to warm up to the normal operating temperature of 77 °C (171 °F).

STEP 7. Access the Cylinder Cutout Test on the Cat ET.

a. Enable the cooling fan, if the fan is not controlled by the ECM. If the ECM controls the cooling fan, the cooling fan will start automatically when the test begins.

b. Shut off all parasitic loads which could affect the results of the test.

STEP 8. Run the Cylinder Cutout Test.

a. Follow the instructions that are provided. The Cylinder Cutout Tests are interactive so the procedure is guided to the finish.

b. Print a report of the test and evaluate the results.

c. If the results of the Cylinder Cutout Test indicate that all of the cylinders are OK, suspect an electrical problem or a mechanical problem with another system on the engine. If the engine is misfiring or if the engine has low power, refer to WP 0011 Troubleshooting, Engine Misfires, Runs Rough or Is Unstable and Low Power/Poor or No Response to Throttle in WP 0011.

d. If the Cylinder Cutout Test indicates that there is a weak cylinder. There may be an injector solenoid that is partially shorted or there may be a mechanical problem with the cylinder.

STEP 9. Monitor the logged diagnostic code screen on the Cat ET. Look for a FMI 11 code that is related to one of the unit injectors.

STEP 10. Use the Injector Solenoid Test to test the injector solenoids.

a. Ensure that the engine has warmed to the normal operating temperature of 77°C (171°F).

b. Stop the engine as follows: On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. DO NOT START THE ENGINE.

c. Access the Injector Solenoid Test on the Cat ET.

d. Activate the test.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

CORRECTIVE ACTION - Continued

NOTE

Do not confuse the Injector Solenoid Test with the Cylinder Cutout Test. The Cylinder Cutout Test is used while the engine is running. The Injector Solenoid Test is used in order to actuate the injector solenoids while the engine is stopped.

e. As each solenoid is energized by the ECM an audible click can be heard at the valve cover. Listen for a click at each valve cover. A black square will appear over the cylinder number on the Cat ET as each cylinder is being fired.

f. Perform the Injector Solenoid Test at least two times.

g. In the previous test step, if the Cylinder Cutout Test indicated a problem with one of cylinders, there may be a problem with the injector for the cylinder or there may be a mechanical problem with the cylinder. If a problem with an injector is suspected, replace the suspect injector with another injector on the engine in order to confirm the problem. Perform the Cylinder Cutout Test again. If the problem moves to the other cylinder with the suspect injector, replace the injector (WP 0118). If the problem remains in the original cylinder, there is a mechanical problem with the cylinder.

WARNING

A strong electrical shock hazard is present if the electrical power is not removed from the ECM. The electronic unit injector system uses 90-120 volts. Failure to comply can cause injury or death to personnel.

STEP 11. If the Injector Solenoid Test reported that one or more cylinders are SHORT, record the cylinder numbers for the injectors that indicate SHORT.

a. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF. A strong electrical shock hazard is present if the electrical power is not removed from the ECM

b. Disconnect the connector ENG-P300 from injector harness ENG J300 at the valve cover.

c. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP.

d. If the status of all cylinders indicates OPEN when the connector for the injector harness is disconnected, there is not a short circuit in the Engine Harness from the ECM connector to the connector for the injector harness. Reconnect the connector for the injector harness. Proceed to STEP 11.

e. If at least one cylinder does not indicate OPEN when the connector for the injector harness is disconnected, record the cylinder numbers that indicate a short circuit.

(1) On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

CORRECTIVE ACTION - Continued

(2) Disconnect engine harness connector ENG-P2 from ECM J2.

(3) Remove the suspect injector's supply wire and return wire from the ENG-P2 connector. Connect the ENG-P2 connector. Refer to Figure 5.

(4) Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP.

(5) Perform the Injector Solenoid Test at least two times. Record the results.

NOTE

The Cat ET will report an OPEN for the injector that shares the supply with the suspect injector. Disregard the result for this injector.

(6) If the Injector Solenoid Test indicates OPEN for the suspect cylinder, the short circuit is in the engine harness. Repair the engine harness or replace the engine harness, as required (WP 0088). Verify that the repair eliminates the problem.

(7) If the Injector Solenoid Test indicates SHORT for the suspect cylinder, there is a problem with the ECM. Replace the ECM (WP 0082). Verify that the repair eliminates the problem.

STEP 12. The Injector Solenoid Test reported that one or more cylinders are OPEN. Record the cylinder numbers for the injectors that indicate OPEN.

a. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

WARNING

A strong electrical shock hazard is present if the electrical power is not removed from the ECM. The electronic unit injector system uses 90-120 volts. Failure to comply can cause injury or death to personnel.

b. Disconnect connector ENG-P300 from injector harness ENG-J300 (Figure 5).

c. Fabricate a jumper wire that is long enough to jumper two connector pins at the connector for the injector harness. Crimp connector sockets to each end of the jumper wire.

d. Insert one end of a jumper wire onto the pin of the supply wire of the suspect injector (Table 3). Insert the other end of the jumper wire onto the pin of the return wire of the suspect injector. For example, if injector 5 is the problem injector, insert the jumper onto terminal 5 and into terminal 8 of the connector for the injector harness. Ensure that the ends of the jumper wire are not in contact with any of the other terminals in the connector.

e. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP.

f. Using the Cat ET, perform the Injector Solenoid Test at least two times.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

CORRECTIVE ACTION - Continued

Table 3. Injector Solenoid Harness Terminals.

TERMINAL (WP 0088, FO-2, Sheet 2)	SIGNAL
1	Injector 1 Supply
2	Injector 2 Supply
3	Injector 3 Supply
4	Injector 4 Supply
5	Injector 5 Supply
6	Injector 6 Supply
7	Injector 6 Return
8	Injector 5 and 6 Return
10	Injector 3 and 4 Return
12	Injector 1 and 2 Return

g. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF. Repeat this test for each suspect Injector. Ensure that the Injector Solenoid Test is disabled before handling the jumper wires.

NOTE

The Cat ET may report a SHORT for the injector that shares the supply with the suspect injector. Disregard the result for this injector.

h. If the Injector Solenoid Test indicates SHORT for the cylinder with the jumper wire, the ECM and the engine harness are OK. Remove the jumper wire. Reconnect the connector for the injector harness. Proceed to STEP 11.

i. If the Injector Solenoid Test indicates open for the cylinder with the jumper wire. The problem is in the engine harness or in the ECM.

(1) If the problem has not been resolved, repair or replace the engine harness (WP 0088). Verify the problem has been resolved.

(2) Install another ECM and retest. If the problem is resolved, install a replacement ECM (WP 0082).

STEP 13. If the problem is not resolved, check the injector harness under the valve cover for open or short circuits in the injector wires.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

CORRECTIVE ACTION - Continued

WARNING

A strong electrical shock hazard is present if the electrical power is not removed from the ECM. The electronic unit injector system uses 90-120 volts. Failure to comply can cause injury or death to personnel.

a. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

b. Remove valve covers (WP 0100).

c. Disconnect the connector for the problem injector.

d. Attach a jumper wire to both terminals at the harness side of the injector connector for the suspect injector (WP 0088, Figure 2, sheet 2).

e. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP.

f. Perform the Injector Solenoid Test at least two times. Record the results of the test.

NOTE

The Cat ET may report a SHORT for the injector that shares the supply with the suspect injector. Disregard the result for this injector.

g. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

   (1) If the Injection Solenoid test indicates SHORT for the cylinder with the suspect injector, the harness under the valve cover is OK. The problem is in the windings of the injector solenoid. Replace the injector (WP 0118). Verify that the repair eliminates the problem.

   (2) If the Injection Solenoid Test does not report SHORT for the suspect injector, the problem appears to be in the harness under the valve cover. Repair or replace the harness under the valve cover (WP 0088). Run the Injector Solenoid Test in order to check the installation of the new harness before installing the valve covers. Verify that the repair eliminates the problem.

h. If the short condition was not present, remove the jumper wire and place the connector in a place that will not allow arcing during the test.

i. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

CORRECTIVE ACTION - Continued

j. Perform the Injector Solenoid Test at least two times.

(1) If the Injector Solenoid Test indicates OPEN for the suspect injector, the harness under the valve cover is OK. The problem is in the windings of the injector solenoid. Replace the injector (WP 0118). Verify that the repair eliminates the problem.

(2) If the Injector Solenoid Test does not indicate OPEN for the suspect injector, the problem appears to be in the engine harness under the valve cover. Replace or repair the harness under the valve cover (WP 0088). Run the Injector Solenoid Test in order to check the installation of the new harness before installing the valve covers. Verify that the repair eliminates the problem.

STEP 14. If the problem is not resolved, there may be a malfunctioning cylinder that is caused by a mechanical problem. Replace the engine (WP 0096).

SYMPTOM

6. Speed Control Test.

System Operation Description:

The Load Sharing Module (LSM) A4 provides a throttle signal to the ECM. The output for rated speed is a pulse width modulated (PWM) signal at a constant frequency. The speed signal varies with the position of the FREQUENCY adjust knob. The output signal is referred to as a duty cycle or as a PWM signal. The output signal is expressed as a percentage between 0 and 100 percent for the speed adjust. Figure 6 shows the Speed Control Circuit.

NOTE

Desired speed can be adjusted from 1700 to 1900 rpm for a 60 Hz system and from 1400 to 1600 rpm for a 50 Hz system. The ECM calculates the desired engine rpm from the rated speed signal and the droop signal. The rated speed signal is valid when the duty cycle is in the range of 5 to 95 percent. If the ECM determines that the rated speed signal is invalid, the engine rpm will be set to the programmed low idle.

MALFUNCTION

Throttle Position Signal. - Abnormal frequency, pulse width, or period.

+24 +/- 3 Vdc is not measured between terminal 15 (+) and terminal 16 (-) on the LSM A4).

CORRECTIVE ACTION

STEP 1. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 2. Measure the voltage between terminal 15 and terminal 16 on LSM A4 (Figure FO-4, sheet 2). Connect one probe of a voltmeter to the + battery terminal of the speed control unit. Connect the other voltmeter probe to the -battery terminal the LSM A4.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

CORRECTIVE ACTION - Continued

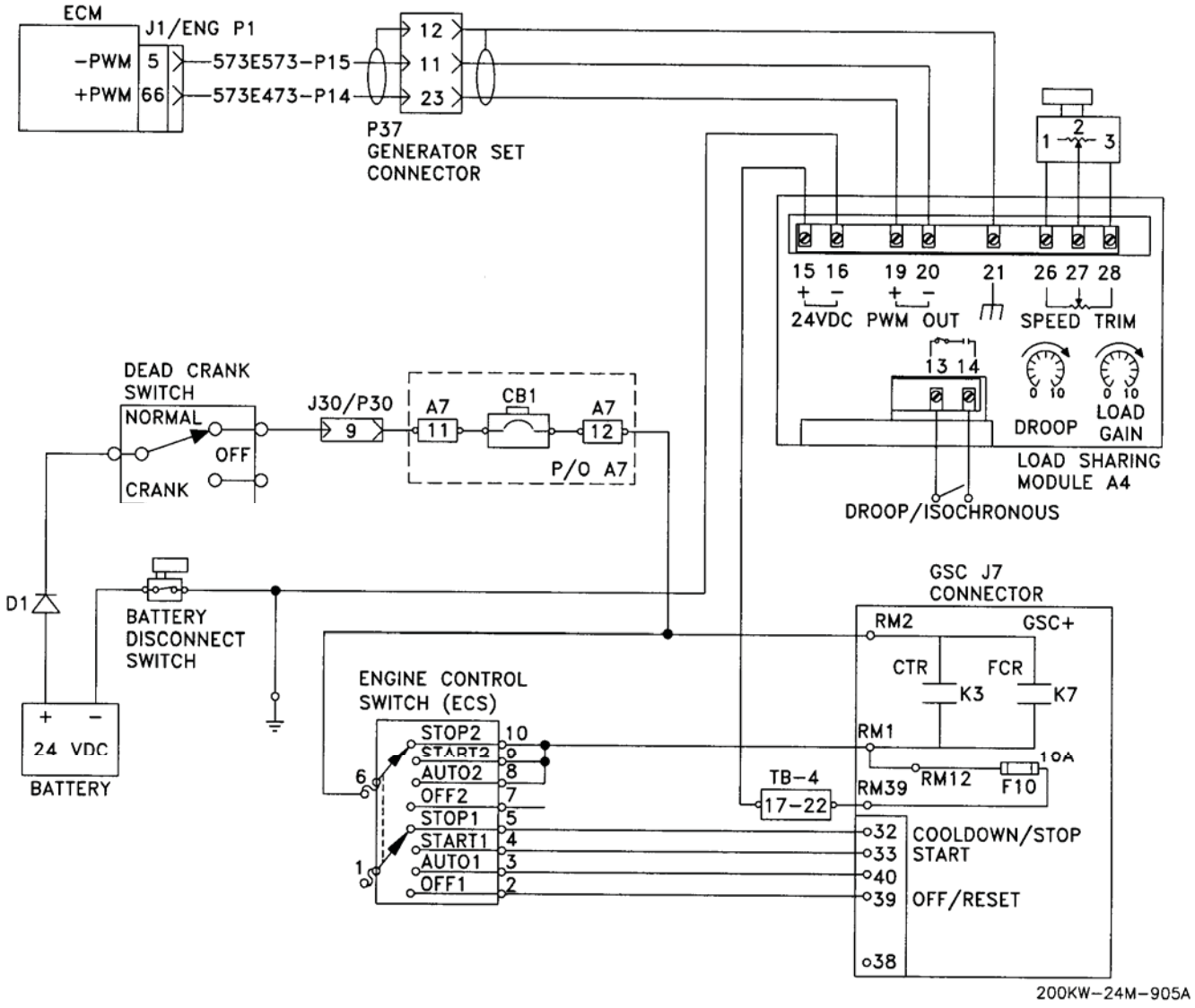

Figure 6. Speed Control Circuits.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

CORRECTIVE ACTION - Continued

STEP 3. Measure the voltage to LSM A4 (Figure 6).

a. Verify that the ground wire on terminal 16 has continuity to ground.

b. Check the voltage between Engine Ground and the following test points in Table 4. If voltage is not present at a test point, the problem is in the device, in the wire or in the connector that precedes the point in the circuit.

Table 4. Speed Control Circuit Test Points.

DEVICE	TERMINAL
Diode D1	Either side
DEAD CRANK SWITCH	Terminals for NORMAL crank
J30/P30 connector	9
Resistor Assembly A7	11
Resistor Assembly A7	12
GSC	RM2
ENGINE CONTROL Switch	6
ENGINE CONTROL Switch	10
GSC	RM1
GSC	RM39
TB-4	17-22
Connector ENG-P37	40

STEP 4. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

a. Connect the Cat ET to connector CDC-P7 (WP 0012).

STEP 5. If the voltage is not 24 ± 3 Vdc at a test point, repair the device, connectors and/or wiring (WP 0041, WP 0042, WP 0043, WP 0088, FO-2, sheet 2; FO-4, sheets 1-4).

STEP 6. After the voltage supply to LSM A4 is correct. Proceed to STEP 7.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

CORRECTIVE ACTION - Continued

STEP 7. Check the throttle position using the Cat ET.

a. Observe the position of the throttle on the Cat ET.

b. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP.

c. Turn the FREQUENCY adjust knob to register the following:
- 60 Hz between 1700 and 1900 rpm
- 50 Hz between 1400 and 1600 rpm

d. Start at the low position. Slowly turn the FREQUENCY adjust knob in the other direction. Monitor the position of the Throttle and the RPM on the Cat ET.

e. If the throttle position shown on the Cat ET changes as the FREQUENCY adjust knob is adjusted, LSM A4 is operating correctly.

f. If the throttle position and RPM reading shown on the Cat ET does not vary as the FREQUENCY adjust knob is adjusted. Proceed to STEP 8.

STEP 8. Check LSM A4.

a. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

b. Remove wires from terminals 19 and 20 of LSM A4.

c. Connect DC voltmeter to terminals 19 and 20 on LSM A4.

d. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP.

e. Turn FREQUENCY adjust potentiometer up and down. Voltage will vary from approximately 4.5 to 9.5 Vdc.

f. On EMCP set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

g. If voltage is incorrect, or erratic, repair wiring as necessary (WP 0088). Verify the problem is resolved. If wiring is good, perform potentiometer test on FREQUENCY adjust potentiometer (WP 0041). Replace potentiometer, as required (WP 0041). Verify the problem is resolved.

h. If FREQUENCY adjust potentiometer is not defective, replace LSM A4 (WP 0042). Verify the problem is resolved.

i. If voltage is correct, remove ENG-P1 connector from the ECM. Measure continuity from the wire on terminals 19 to ENG-P1-66 and the wire on terminal 20 to ENG-P1-5. If continuity is good, replace ECM (WP 0082). Verify the problem is resolved.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

SYMPTOM

7. Electronic Service Tool (Cat ET) will not communicate with ECM.

System Operation

If the Electronic Service Tool (Cat ET) will not communicate with the ECM the following possible problems are listed in order of most probable first.

- Configuration for the communications adapter
- Electrical connectors
- Communication adapter and/or cables
- Electrical power supply to connector CDC-P7
- Caterpillar Electronic Technician (ET) and related hardware
- Electrical power supply to the Electronic Control Module (ECM)
- Flash file
- Cat Data Link

MALFUNCTION

The Cat ET will not communicate with the ECM.

CORRECTIVE ACTION

STEP 1. On EMCP, set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Connect the Cat ET to connector CDC-P7 (WP 0012).

STEP 3. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 4. Check the configuration for the communications adapter.

a. Access Preferences under the Utilities menu on Cat ET.

b. Verify that the correct communications interface device is selected.

c. Verify that the correct port is selected for use by the communication adapter.

NOTE

The most commonly used port is COM 1.

d. Under Advanced menu, verify the baud rate is set for 57600.

e. Check for any hardware that is utilizing the same port as the communications adapter. If any devices are configured to use the same port, exit or close the software programs for that device.

STEP 5. Check the electrical connectors.

a. Check for correct installation of the ENG-P1 and ENG-P2 ECM connectors (WP 0088).

b. Check connector CDC-P7 (WP 0012).

c. Inspect all associated electrical wiring and connectors. Perform Wiggle Test (SYMPTOM 1) if intermittent problem exist.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

CORRECTIVE ACTION - Continued

STEP 6. Communication adapter and/or cables

a. If you are using a communication adapter II, ensure that the firmware and driver files for the communication adapter are the most current files that are available. If the firmware and driver files do not match, the communication adapter will not communicate with Cat ET (WP 0012).

b. Disconnect the communication adapter and the cables from CDC-P7 connector. Reconnect the communication adapter to CDC-P7 connector.

c. Verify that the correct cable is being used between the communication adapter and CDC-P7 connector.

STEP 7. Verify that battery voltage is present between terminals A and B of the service tool connector (WP 0088, FO-2, sheet 2). If the communication adapter is not receiving power, the display on the communication adapter will be blank.

STEP 8. In order to eliminate Cat ET and the related hardware as the problem, connect Cat ET to a different engine. If the same problem occurs on a different engine, check Cat ET and the related hardware in order to determine the cause of the problem.

STEP 9. Check power to the ECM. Refer to Troubleshooting, Electrical Power Supply Circuit Test.

NOTE

If the ECM is not receiving battery voltage, the ECM will not communicate.

STEP 10. Ensure that the correct flash file is properly installed in the ECM. (WP 0013 SYMPTOM 9).

NOTE

A new ECM is not programmed to any specific engine until a flash file has been installed. The engine will not start and the engine will not communicate with Cat ET until the flash file has been downloaded. Refer to Troubleshooting, Flash Programming (WP 0013 SYMPTOM 9).

STEP 11. Troubleshoot the Cat data link for possible problems. Refer to Troubleshooting, WP 0009 SYMPTOM 26.

STEP 12. Verify the problem has been resolved.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

SYMPTOM

8. Engine Timing Sensor Calibrate.

This procedure is required if a 261-E-13 Engine Timing Calibration code is active. This procedure requires 2 people.

Also use this procedure if any of the following conditions exist:

The ECM has been replaced.
The Engine Timing sensors have been replaced.
The front engine gear group has been serviced.

The following tools (Table 5) are required:

Table 5. Required Tools

PART NUMBER	DESCRIPTION
7X-1171	Transducer Adapter
6V-2197	Transducer
7X-1695	Cable Assembly
170-3519	Harness

MALFUNCTION

Engine timing is not calibrated.

CORRECTIVE ACTION

STEP 1. On EMCP, set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Remove timing calibration plug (Figure 7, item 1) from right side of engine.

CAUTION

If crankshaft counterweight is not positioned directly in front of timing calibration port when timing calibration transducer is installed, damage to the timing calibration transducer will result when engine is started.

STEP 3. One person use a flashlight to look for the crankshaft counterweight.

STEP 4 Second person rotates the engine by bumping the DEAD CRANK SWITCH (quickly setting DEAD CRANK SWITCH to CRANK then back to OFF). Rotate engine in increments until crankshaft counterweight is positioned directly in front of the timing calibration port. Adjust crankshaft counterweight position as required.

STEP 5. Install the 7X-1171 transducer adapter into the timing calibration port hole.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

CORRECTIVE ACTION - Continued

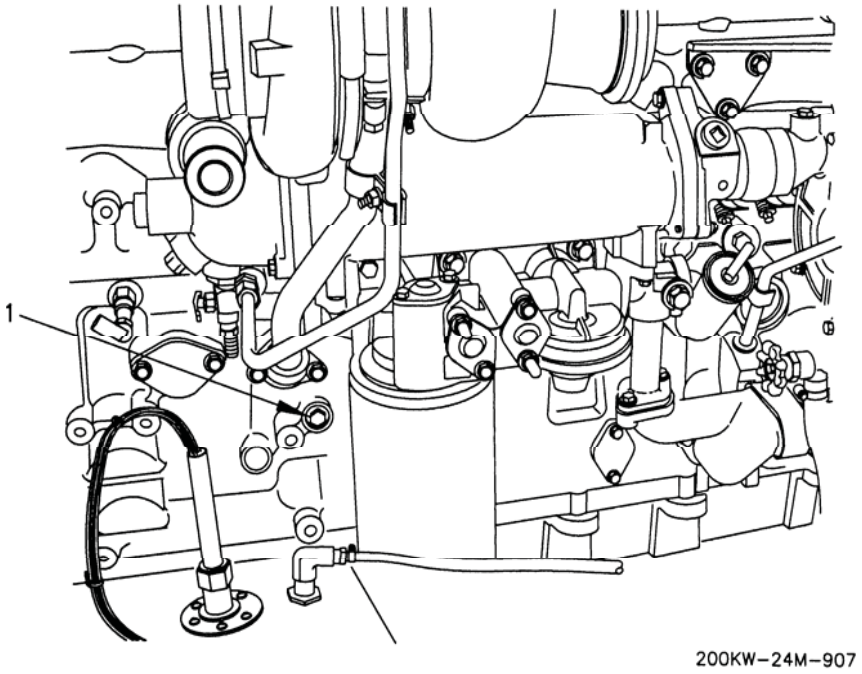

Figure 7. Timing Calibration Plug.

STEP 6. Install the 6V-2197 transducer as follows:

a. Apply clean engine oil to the 2D-6392 O-ring seal. Install the O-ring seal onto the end of the 6V-2197 transducer.

b. Insert the 6V-2197 transducer through the 7X-1171 transducer adapter. Insert the transducer until contact is made with the surface of the crankshaft counterweight. Pull the transducer 0.04 inch (1.0 mm) away from the crankshaft counterweight.

c. Tighten the nut on the transducer adapter.

d. Disconnect the ENG-J400 connector from ENG-P400 harness connector (FO-2, sheet 1).

e. Connect the 7X-1695 cable assembly to the engine timing calibration transducer and to the ENG-P400 timing calibration transducer connector (FO-2, Sheet 1).

STEP 7. Connect the Cat ET to connector CDC-P7 (WP 0012).

STEP 8. Set the Battery Disconnect Switch to ON. Set the DEAD CRANK SWITCH to NORMAL. On the EMCP, set the ENGINE CONTROL switch to MANUAL START. Run the engine until the engine has exited cold mode operation.

STEP 9. Start the Cat ET (WP 0012). Access the TIMING CALIBRATION screen on the Cat ET by going to drop-down menu SERVICE, then CALIBRATIONS, then TIMING CALIBRATION.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

CORRECTIVE ACTION - Continued

STEP 10. Disconnect wires from terminals 19 and 20 on LSM A4.

STEP 11. Select CONTINUE on the Cat ET. Wait until the Cat ET indicates that the timing is calibrated.

STEP 12. On EMCP, set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

NOTE

Disconnect the 7X-1695 Cable Assembly before exiting the TIMING CALIBRATION screen to prevent diagnostic codes from activating.

STEP 13. Disconnect the 7X-1695 cable assembly.

STEP 14. Exit the TIMING CALIBRATION screen on the Cat ET.

STEP 15. On the EMCP, set the ENGINE CONTROL switch to OFF/RESET.

STEP 16. Remove the 6V-2197 transducer and the 7X-1171 transducer adapter.

STEP 17. Reinstall the timing calibration plug.

STEP 18. Verify the problem has been resolved.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

SYMPTOM

9. Flash Programming

This is a method of programming or updating the flash file in an engine's Electronic Control Module (ECM). Caterpillar Electronic Technician (ET) is used to flash program a file into the memory of the engine's ECM. Use this procedure if original ECM flash files are missing or not available. To update configuration files, refer to WP 0013, SYMPTOM 13.

MALFUNCTION

Personality Module Mismatch. ECM has an incorrect or outdated Flash File.

CORRECTIVE ACTION

STEP 1. On EMCP, set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Connect the Cat ET to connector CDC-P7 (WP 0012).

STEP 3. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 4. Establish communication between Cat ET and the engine's ECM.

STEP 5. Select WinFlash from the Utilities menu on Cat ET.

NOTE

If WinFlash utility will not communicate with the ECM, refer to Troubleshooting, Electronic Service Tool (Cat ET) Will Not Communicate with ECM.

STEP 6. Program the flash file into the ECM.

a. Select the engine ECM under the Detected ECMs.

b. Press the Browse button in order to select the name of the flash file that will be programmed into the ECM.

NOTE

The Flash Files are located on a CD provided with the Cat ET software.

c. When the correct flash file is selected, press the Open button.

d. Verify that the File Values match the application. If the File Values do not match the application, obtain the correct flash file.

e. When the correct flash file is selected, press the Begin Flash button.

f. Cat ET will indicate when flash programming has been successfully completed.

STEP 7. Turn the ENGINE CONTROL switch to MANUAL START. Check for proper operation. Repair any active diagnostic or event codes.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

SYMPTOM

10. Engine Fuel Pressure Reading.

This procedure is required if a fuel pressure problem is suspected.

MALFUNCTION

Poor engine performance. Low fuel pressure is suspected.

CORRECTIVE ACTION

STEP 1. On EMCP, set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Connect the Cat ET to connector CDC-P7 (WP 0012).

STEP 3. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to MANUAL START.

STEP 4. Establish communication between Cat ET and the engine's ECM.

STEP 5. Select STATUS from the icons list on the Cat ET.

STEP 6. Select a group of engine sensors that include the fuel pressure. Read the fuel pressure with the engine running.

a. The pressure should be 85 to 90 psi (586 to 655 kPa) during both normal operating conditions and load conditions.

b. The pressure should be 85 to 90 psi (586 to 655 kPa) at low idle.

c. If the fuel pressure is not within spec, troubleshoot the restriction and replace components as required (WP 0057 thru WP 0061).

STEP 7. Verify the problem has been resolved.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

SYMPTOM

11. Engine Status

This procedure is required if an engine operating parameter is needed to troubleshoot a performance problem.

MALFUNCTION

Poor engine performance. Need to verify engine operating parameters.

CORRECTIVE ACTION

STEP 1. On EMCP, set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Connect the Cat ET to connector CDC-P7 (WP 0012).

STEP 3. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to MANUAL START.

STEP 4. Establish communication between Cat ET and the engine's ECM.

STEP 5. Select STATUS from the icons list on the Cat ET.

STEP 6. Select a group of engine sensors that include the needed parameter. Read the parameter with the engine running.

STEP 7. Use the status data to assist in troubleshooting a problem.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

SYMPTOM

12. Load Injector Code.

When an injector is replaced, program the new injector code into the ECM. If the ECM is replaced, all six injector codes must be programmed into the new ECM.

MALFUNCTION

Injector codes must be programmed into ECM after injector replacement or ECM replacement.

CORRECTIVE ACTION

STEP 1. On EMCP, set ENGINE CONTROL switch to OFF/RESET. Set Battery Disconnect Switch to OFF. Set DEAD CRANK SWITCH to OFF.

STEP 2. Connect the Cat ET to connector CDC-P7 (WP 0012).

STEP 3. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP.

STEP 4. Establish communication between Cat ET and the engine's ECM.

STEP 5. On the Cat ET top menu bar, select the SERVICE pull down menu. Select CALIBRATIONS. Select INJECTOR CODES CALIBRATION.

a. The screen will display a list of 6 injectors and their codes.

b. Select the injector that required a code change.

c. Click the CHANGE button in the lower left corner of the screen. A window will pop up (named Change Parameter Value).

d. Enter the new code in the New Value location. Click on the OK button. A small window appears asking: *"Are you sure you want to program this parameter?"* Select YES.

e. The new injector code (parameter) should be displayed in the list of injectors and their codes.

STEP 6. On EMCP set ENGINE CONTROL switch to MANUAL START. Verify the engine is running properly.

SYMPTOM

13. Copy Configuration/ECM Replacement

When replacing ECM, the configuration data from the old ECM needs to be copied and loaded into the replacement ECM.

MALFUNCTION

Replacement ECM requires configuration data.

ELECTRONIC TECHNICIAN (ET) TROUBLESHOOTING - Continued

CORRECTIVE ACTION

STEP 1. Record the configuration data.

a. Connect Cat ET to the CDC-P7.

b. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP.

c. Use the Copy Configuration/ECM Replacement feature that is found under the Service menu on Cat ET. Select Load from ECM in order to copy the configuration data from the suspect ECM.

d. Print the parameters from the Configuration screen on Cat ET. If a printer is unavailable, record all of the parameters. Record any logged diagnostic codes and logged event codes for your records.

NOTE

If the Copy Configuration process fails and the parameters were not obtained in Step 1.c, the parameters must be obtained elsewhere. Some of the parameters are stamped on the engine information plate. Most of the parameters must be obtained from the factory. If this condition exists, the flash file can be loaded and the ECM will set the configuration parameters to default settings. The configuration parameters can then be manually updated.

STEP 2. After the ECM has been replaced (WP 0082) perform the following steps to copy the configuration data into the replacement ECM.

NOTE

When an ECM is replaced, the system configuration parameters must be programmed into the new ECM. **A new ECM will allow these parameters to be programmed ONCE without factory passwords.** After the initial programming, some parameters are protected by factory passwords.

a. Connect Cat ET to the CDC-P7.

b. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP.

c. Flash program the flash file into the ECM. Refer to WP 0013, SYMPTOM 9.

d. If the Copy Configuration process from Step 1.c was successful, return to the Copy Configuration/ECM Replacement screen on Cat ET and select Program ECM.

e. If the Copy Configuration process from Step 1.c was unsuccessful, manually program the ECM parameters.

END OF WORK PACKAGE

CHAPTER 3

UNIT (FIELD) LEVEL MAINTENANCE INSTRUCTIONS

CHAPTER 3

UNIT (FIELD) LEVEL MAINTENANCE INSTRUCTIONS

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UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
SERVICE UPON RECEIPT

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Materials/Parts

Breakthrough cleaning solvent (WP 0124, Item 45)
Foam damping sheet (WP 0124, Item 11)

Personnel Required

One

References

AFTO Form 22
DA Form 2028-2
DA PAM 750-8
DD Form 1397
SF Form 361
SF Form 368
TM 9-6115-730-10
TM 9-6115-730-24P
TO 00-5-1

CHECKING UNPACKED EQUIPMENT

1. Read and follow all instructions on DD Form 1397 attached to conspicuous part of TQG.
2. Remove metal strapping, plywood, tapes, seals, and wrappings, if necessary.

WARNING

Cleaning solvent is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with cleaning solvent. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply can cause injury or death to personnel.

3. Remove rust preventive compound from coated exterior parts with breakthrough cleaning solvent.
4. Inspect equipment for damage incurred during shipment. If equipment has been damaged, report damage on SF Form 361, Transportation Discrepancy Report.
5. Check equipment against packing slip to see if shipment is complete. Report all discrepancies in accordance with applicable service instructions (see DA PAM 750-8).
6. Check to see if equipment has been modified.

PRELIMINARY CHECKS AND ADJUSTMENT OF EQUIPMENT

1. (US Army and Air Force) Inspect equipment for possible damage incurred during shipment. If equipment has been damaged, report damage on SF Form 368, Product Quality Deficiency Report.
2. (US Army) Check equipment against packing slip to see if shipment is complete. Report all differences using procedure given in DA PAM 750-8.

PRELIMINARY CHECKS AND ADJUSTMENT OF EQUIPMENT - Continued

3. (US Army and Air Force) Perform Preventive Maintenance Checks and Services (PMCS) (TM 9-6115-730-10).

4. If there is a recommended change to equipment technical publications, complete form DA 2028-2 and forward it by email <AMSEL-LC-LEO-PUBS-CHG@mail1.Monmouth.army.mil>, fax to 732-532-3421, or mail to Commander, U.S. Army Communications-Electronics Life Cycle Management Command, ATTN: AMSEL-LC-LEO-D-CS-CFO, Fort Monmouth, New Jersey 07703-5000. For Air Force, use AFTO Form 22 in accordance with TO 00-5-1 and mail directly to Commander, WR-ALC/LEET, Robins AFB, GA, 31098. You may also e-mail your form to <http://wralc.tilta.afto@robins.af.mil>.

OUTPUT VOLTAGE SETTING

WARNING

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is set to OFF/RESET, and DEAD CRANK SWITCH is OFF before proceeding.

2. Set Battery Disconnect Switch to OFF.

3. Remove four nuts (Figure 1, Item 1), washers (Figure 1, Item 2), and clear protective panel (Figure 1, Item 3) from the reconnection board.

4. Remove 12 nuts (Figure 1, Item 4) and reconnection board (Figure 1, Item 5).

5. Align the arrow on the reconnection board (Figure 1, Item 5) with the arrow on the base corresponding to the desired generator output voltage(s).

OUTPUT VOLTAGE SETTING - Continued

6. Install reconnection board (Figure 1, Item 5) and secure with 13 nuts (Figure 1, Item 4). Torque nuts (Figure 1, Item 4) to 20 lb-ft (27 Nm).

7. Install clear protective panel (Figure 1, Item 3) and secure with four washers (Figure 1, Item 2) and nuts (Figure 1, Item 1).

8. Close right rear doors.

9. Reprogram DVR and GSC, as required per WP 0083.

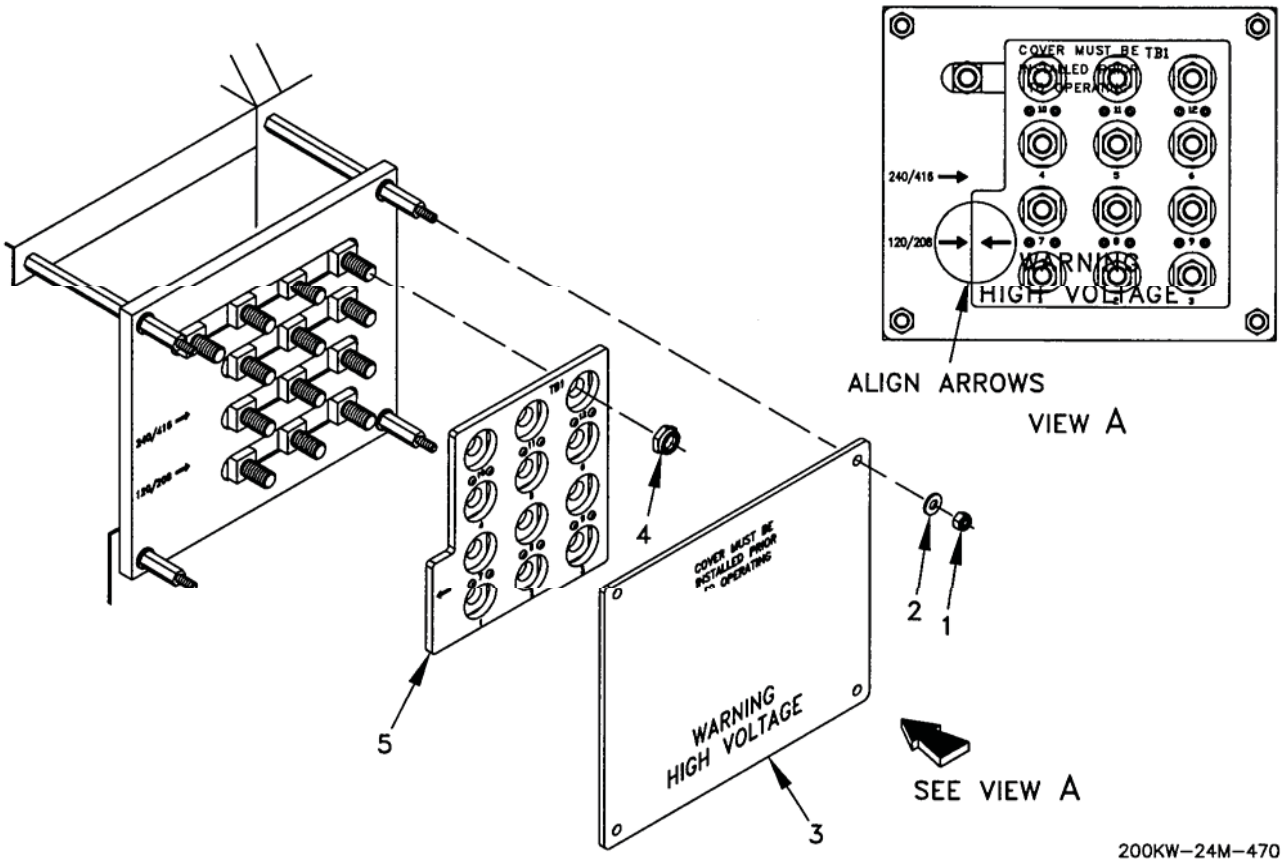

Figure 1. Reconnection Terminal Board Voltage Setting.

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
PMCS INTRODUCTION

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's
(WP 0123, Item 1)

Materials/Parts

Breakthrough cleaning solvent
(WP 0124, Item 45)
Wiping rags (WP 0124, Item 35)

Personnel Required

One

References

DA Form 5988-E
PAM 750-8
TM 9-2330-376-14&P
TM 750-254
TM 9-6115-730-24P

INTRODUCTION

PMCS are performed to keep the TQG in operating condition. Inspect the TQG within specified intervals so defects are found and corrected or problems are reported before any serious damage or failure occurs. Do the PMCS per WP 0016, Table 1. Pay attention to WARNINGs and CAUTIONs. A WARNING means someone might be killed or injured. A CAUTION means equipment could be damaged.

CAUTION

Designated intervals are performed under usual operating conditions. PMCS intervals must be performed more frequently when operating under unusual conditions, to prevent premature engine failure.

1. Always perform preventive maintenance in the same order so it gets to be a habit. Once you have had some practice, you will spot anything wrong in a hurry.

2. Tools included with the TQG are to be used when doing the PMCS. Wiping rags are needed to remove dirt or grease.

3. If you find something wrong when performing the PMCS, fix it if you can, using troubleshooting procedures (see WP 0004 thru WP 0011) and/or maintenance procedures (see Chapter 3).

4. If something appears to be wrong and you cannot repair it, write it down on your DA Form 5988-E. If you find something seriously wrong, report it to DS maintenance as soon as possible.

5. Item numbers in column 1 of WP 0016, PMCS Table 1 indicate the PMCS sequence. Use these item numbers for the TM number column on DA Form 5988-E.

6. Information in column 6 of WP 0016, Table 1 lists conditions that make the TQG not ready/available. Write up items not repaired on DA Form 5988-E for DS maintenance. For further information on how to use these forms, see DA PAM 750-8.

7. Ensure all Operator PMCS has been performed, see TM 9-6115-730 -10.

FLUID LEAKAGE

Wetness around seals, gaskets, fittings, or connections indicates leakage. A stain also denotes leakage. If a fitting or connector is loose, tighten it. If a fitting or connector is broken or defective, repair it.

Leak Definition for PMCS

CAUTION

Operation is allowable with class I and II leakage. However, any wetness or leakage of fuel is classified as a class III leak and the TQG must be shut down immediately and the problem corrected. All other class III leaks must be repaired immediately or reported to your supervisor. When operating with class I or class II leaks, check fluid levels more frequently. Failure to do this will result in damage to the 200 kW TQG.

1. Class I - Leakage indicated by wetness or discoloration, but not great enough to form drops.

2. Class II - Leakage great enough to form drops, but not enough to cause drops to drip from item being checked/inspected.

3. Class III - Leakage great enough to form drops that fall from the item being checked/inspected.

INSPECTION

Look for signs of a problem or trouble. You can feel, smell, hear, or see many problems. Be alert when in or around the TQG.

Inspect the TQG to see if items are in good condition. Are they correctly assembled, stowed, and secured; excessively worn, leaking, or corroded; or properly lubricated? Correct any problems found or notify DS maintenance.

There are some common items to check all over the TQG. These include the following:

WARNING

Metal jewelry can conduct electricity and become entangled in generator set components. Remove all metal jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

WARNING

Cleaning solvent is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with cleaning solvent. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply can cause injury or death to personnel.

1. Dirt, grease, oil, and debris: They only get in the way and may cover up a serious problem. Keep the equipment clean. Clean as you work and as needed. Use Breakthrough cleaning solvent to clean metal surfaces. Use soap and water to clean rubber or plastic material.

2. Bolts, clamps, nuts, and screws: Continuously check for looseness. Look for chipped paint, bare metal, rust, or corrosion around bolt and screw heads and nuts. Tighten them when you find them loose (see WP 0085).

3. Welds: Many items on the TQG are welded. To check these welds, look for chipped paint, rust, corrosion, or gaps. When these conditions exist, notify DS maintenance on DA Form 5988-E.

4. Electrical wires, connectors, and harnesses: Tighten loose connectors. Look for cracked or broken insulation, bare wires, and broken connectors.

5. Hoses and fluid lines: Check hoses and fluid lines for wear, damage, and leaks. Ensure clamps and fittings are tight.

6. Hinges: Check hinges for security and operation.

7. Data plates: Check data, caution, and warning plates for security and legibility.

PMCS COLUMN DESCRIPTIONS (TABLE 1)

ITEM NO. - Lists order in which PMCS should be performed; also used as a source of item numbers for the TM number column on DA Form 5988-E when recording results of PMCS.

INTERVAL - Indicates when each check is to be performed.

MANHOUR - Lists approximate time required to perform check.

ITEM TO BE CHECKED OR SERVICED - Lists item to be checked or serviced.

PROCEDURE - Provides brief description of procedure as well as any information required to accomplish each check or service.

EQUIPMENT NOT READY/AVAILABLE IF - Lists condition in which TQG should not be operated or accepted.

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

PMCS, INCLUDING LUBRICATION INSTRUCTIONS

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

Table 1. Preventive Maintenance Checks and Services.

ITEM NO.	INTERVAL	MAN-HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
				200 kW TQG	
1	First 100 hours		Engine Oil/Oil Filter	Change engine oil and oil filter (WP 0079).	Engine oil change/ filter change not accomplished.
2	Quarterly or 300 hours		XM1061E1 Trailer (if mounted)	Perform quarterly PMCS (TM 9-2330-376-14&P).	Any failed inspection.
				TQG EXTERIOR	
3	Quarterly or 300 hours		Housing	Check the entire housing, to include doors, panels, latches, and hinges, for damage, missing parts, and secure mounting. Check mounting points for rust or corrosion and loose or missing parts (WP 0018 thru WP 0040).	Any doors, panels, latches, or hinges damaged, loose, or missing parts. Mounting points loose.

Table 1. Preventive Maintenance Checks and Services - Continued.

ITEM NO.	INTERVAL	MAN-HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
				TQG INTERIOR	
4	Quarterly or 300 hours		Control Box Assembly	Check panel gauges, switches, controls, decals/data plates for damage, missing parts, readability, and secure mounting (WP 0041, WP 0042).	Any gauges, switches, controls, decals/data plates damaged or missing parts. Any gauges or decals/data plates not readable. Any loose components.
5	Quarterly or 300 hours		Reconnection Terminal Board	Check reconnection terminal board for damage, rust, corrosion, missing parts, and secure mounting (WP 0045).	Terminal board damaged or missing parts. Terminal board cannot be securely mounted.
6	Quarterly or 300 hours		Load Terminal Board	Check load terminal board for damage, rust, corrosion, missing parts, and secure mounting (WP 0046).	Terminal board damaged or missing parts. Terminal board cannot be securely mounted.
7	Quarterly or 300 hours		Battery Cables	Check battery cables for damage, corrosion, missing parts, and secure mounting. Check cables for fraying, cuts, or nicks (WP 0047).	Battery cables damaged, corroded, or missing parts. Cables cannot be securely mounted.
8	Quarterly or 300 hours		Batteries	Clean battery terminals. Check terminals for looseness, breaks, or damage (WP 0050).	Battery terminals loose, broken, or damaged. Batteries will not hold charge.
9	Quarterly or 300 hours		Batteries (if lead-acid type)	Check electrolyte level; add distilled water as required.	Electrolyte level below top of plates.
10	Quarterly or 300 hours		Power Cables	Check power cables for damage, corrosion, missing parts, and secure mounting. Check cables for fraying, cuts, or nicks (WP 0048).	Power cables damaged, corroded, or missing parts. Cables cannot be securely mounted.

Table 1. Preventive Maintenance Checks and Services - Continued.

ITEM NO.	INTERVAL	MAN-HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
11	Quarterly or 300 hours		Main Load Contactor K1	Check main load contactor for corrosion, loose or missing parts, loose cable connections, evidence of arcing, or loose mounting (WP 0049).	Any defect that would prevent operation.
12	Quarterly or 300 hours		Current Transformers	Check seven current transformers for corrosion, loose or missing parts, loose connections, evidence of arcing or overheating, leaking, or loose mounting (WP 0052).	Any defect that would prevent operation.
13	Quarterly or 300 hours		Power Transformers	Check two potential transformers for corrosion, loose or missing parts, loose connections, evidence of arcing or overheating, leaking, or loose mounting (WP 0053).	Any defect that would prevent operation.
14	Quarterly or 300 hours		Slave Receptacle	Check slave receptacle for corrosion, loose or missing parts, loose connections, evidence of arcing or overheating, or loose mounting (WP 0054).	Any defect that would prevent operation.
15	Quarterly or 300 hours		Electrical Installation	Check electrical components for corrosion, loose or missing parts, loose connections, evidence of arcing or overheating, or loose mounting (WP 0055).	Any defect that would prevent operation.
				ENGINE	
16	Quarterly or 300 hours		Engine Oil/Oil Filter	Change engine oil and oil filter (WP 0079).	Engine oil change/ filter change not accomplished.
17	Quarterly or 300 hours		Oil Pan	Check magnetic plug for metal particles (WP 0079).	Metal particles found on plug.
18	Quarterly or 300 hours		Fuel System	Check fuel system for secure mounting, leaks, damaged tubes or hoses (WP 0056 thru WP 0063).	Any leaks or defect that would prevent operation. Any leak from fuel system.

Table 1. Preventive Maintenance Checks and Services - Continued.

ITEM NO.	INTERVAL	MAN-HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
19	Quarterly or 300 hours		Fuel Filter	Replace fuel filter (WP 0080).	Fuel filter has not been replaced as required. Any leak.
20	Quarterly or 300 hours		Auxiliary Fuel Pump Strainer	Clean strainer (WP 0059).	Strainer has not been cleaned as required. Any leak.
21	Quarterly or 300 hours		Water Separator Filter	Replace water separator filter element (WP 0061).	Water separator filter has not been replaced as required. Any leak.
22	Quarterly or 300 hours		Cooling System	Check radiator, coolant hoses, surge tank, fan and fan guards for damage and secure mounting. Check radiator for damage or leaks. Use compressed air to remove debris from radiator (WP 0064 thru WP 0068).	Any damage that will prevent operation. Any part that cannot be securely mounted. Radiator leaking or damaged.
23	Quarterly or 300 hours		Cooling System	Check coolant level and add coolant mixture as required. Inspect coolant for discoloration, rust, or contamination (WP 0064).	Any discoloration, rust, or contamination.
24	Quarterly or 300 hours		Muffler	Check muffler for leaks, restrictions, accumulation of carbon deposits, and loose hardware. Replace muffler if required (WP 0069).	Muffler leaks, is damaged, or loose.
25	Quarterly or 300 hours		Winterization Kit (if installed)	Check winterization kit components for rust, corrosion, missing parts, leaks, and secure mounting (WP 0089 thru WP 0093).	Any damage that will prevent operation. Any part that cannot be securely mounted. Any leak.
26	Quarterly or 300 hours		Generator	Check generator for damage, wear, rust, corrosion, missing parts, and secure mounting.	Generator damaged, worn, rusted, or corroded. Parts missing or loose mounting.
27	Semiannually or 750 hours		Air Cleaner	Check air cleaner for cleanliness, damage and secure mounting. Clean or replace air filter element (WP 0071). Clean housing with clean cloth.	Air cleaner clogged, damaged, or loose.

Table 1. Preventive Maintenance Checks and Services - Continued.

ITEM NO.	INTERVAL	MAN-HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
28	Semiannually or 750 hours		Crankcase Ventilation Filter	Check crankcase ventilation filter for cleanliness, damage, and secure mounting. Clean or replace filter element (WP 0070).	Filter clogged, damaged, or loose.
29	Annually or 1500 hours		Fan Belts	Replace fan belts (WP 0075).	Fan belts not replaced as required.
30	Annually or 1500 hours		Cooling System	Drain and flush cooling system (see TM 750-254). Add proper coolant mixture (WP 0068).	Cooling system has not been flushed as required.
31	Annually or 2000 hours		Engine Mounts	Inspect engine mounts for cracks, worn, loose, or missing hardware, or loose mounting.	Any parts missing. Mounts loose or broken.
32	Annually or 2000 hours		Engine Cleanliness	Clean engine exterior. Pay attention to areas which reveal leakage or damage.	Engine dirty so that leaks or damage cannot be detected.

Table 2. PMCS Mandatory Replacement Parts List.

ITEM NO.	PART NUMBER (CAGEC)	NSN	NOMENCLATURE	QTY
QUARTERLY (300 HOURS)				
1	1R0716 (11083)	2940-00-125-9544	Oil Filter	1
2	1R0749 (11083)	2910-01-455-4730	Fuel Filter	1
3	133-5671 (11083)	2910-01-533-4447	Water Separator Filter Element with Gasket	1
SEMIANNUAL (750 HOURS)				
1	P182049 (18265)	2940-01-254-9890	Air Cleaner Primary Filter Element	1
2	P116446 (18265)	2940-01-027-2217	Air Cleaner Safety Filter Element	1
3	P105740 (18265)	5330-01-027-9446	Gasket	1
ANNUAL (1500 HOURS)				
1	7M4707 (11083)	3030-01-336-5525	Alternator V-Belt, Matched Set	1

LUBRICATION INSTRUCTIONS

These lubrication instructions are for unit (O) maintenance. Lubrication intervals (on-condition or hard time) are based on normal operation. Lubricate more frequently during constant use, and less during inactive periods. The task-hour specified is the time you need to do all the services prescribed for a particular interval. Use correct grade of lubricant for seasonal temperature expected. The lubrication intervals and symbols are listed below:

300 hours = Quarterly 1000 hours = Annually 2000 hours = Bi-Annually

LUBRICATION INSTRUCTIONS - Continued

WARNING

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set, and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination.

Before you start your lubrications:

Always	Never
a. Use Lubrication Instructions as your guide.	a. Use wrong type/grade lubricant.
b. Use correct type/grade lubricant.	b. Use too much lubricant.
c. Clean area where lubricant is to be applied to prevent buildup of dirt, grit, and contaminants.	c. Apply lubricant to dirty components.

Authorized lubricants and fluids are listed in Tables 3 through 6.

LUBRICATION INSTRUCTIONS - Continued

Table 3. Engine Oil.

AMBIENT TEMPERATURE	Degrees F / Degrees C	-50 / -46	-30 / -34	-10 / -23	+10 / -12	+30 / -1	+50 / 10	+70 / 21	+90 / 32	+110 / 43	+130 / 54
MIL-PRF-46167 OEA											
MIL-PRF-2104 OE/HDO-10											
MIL-PRF-2104 OE/HDO-30											
MIL-PRF-2104 OE/HDO-40											
MIL-PRF-2104 OE/HDO-15/40											

Winterization kit required below -25°F (-32°C).

Table 4. Engine Coolant.

AMBIENT TEMPERATURE	RADIATOR COOLANT	RATIO	NOTES
-50 to +120 degrees F (-46 to +49 degrees C)	A-A-52624 antifreeze/ water	Antifreeze 60% Water 40%	This offers the best freeze protection (-60 degrees F) and the best boil protect-tion (+232 degrees F).
40 to +120 degrees F (+4 to +49 degrees C)	Water with MIL-A-53009 corrosion inhibitor	35:1	No freeze or boil protec-tion.

Table 5. Fuel.

AMBIENT TEMP	Degrees F / Degrees C	-50 / -46	-25 / -32	-15 / -26	0 / -18	+5 / -15	+15 / -9	+20 / -7	+30 / -1	+40 / +4	+70 / +21	+90 / +32	+110 / +38	+120 / +49
A-A-52557 DF-1														
A-A-52557 DF-2														
MIL-PFR-5624 JP-5 MIL-T-83133 JP-8														

LUBRICATION INSTRUCTIONS - Continued

Table 6. Lubrication Requirements.

INTERVAL	USAGE	CAPACITY	LUBRICANT
First 100 hours	Engine oil and oil filter change (WP 0079)	30 quarts (27.3 L)	Engine Oil (see Table 3)
Quarterly or 300 hours	Engine oil and oil filter change (WP 0079)	30 quarts (27.3 L)	Engine Oil (see Table 3)
Annually or 1000 hours	Door hinges	N/A	Engine oil (see Table 3)
Annually or 1000 hours	Cooling system drain and flush (WP 0064)	38 quart (36 L)	Coolant mixture (see Table 4)

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
GENERAL MAINTENANCE INSTRUCTIONS

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Tool Kit, General Mechanic's (WP 0123, Item 1)

Materials/Parts

Breakthrough cleaning solvent (WP 0124, Item 45)
Crocus cloth (WP 0124, Item 9)
Marker tags (WP 0124, Item 49)
Wiping rags (WP 0124, Item 35)

Personnel Required

One

References

TC 9-237
TM 9-6115-730-24P

SCOPE

These general maintenance instructions contain general shop practices you must be familiar with to properly maintain the TQG. You should read and understand these practices and methods before starting unit maintenance tasks.

WORK SAFETY

Before starting any task, find out how much repair or replacement is needed to fix the equipment as described in this manual. Sometimes the reason for equipment failure can be obvious and complete teardown is not necessary. Disassemble equipment only as far as necessary to repair or replace damaged or broken parts.

All tags and forms attached to the equipment must be checked to learn the reason for removal from service. Also, check Technical Bulletins (TB) for equipment changes and updates.

In some cases a part may be damaged by removal. If the part appears to be good and other parts behind it are not defective, leave it on and continue the procedure.

CLEANING INSTRUCTIONS

Cleaning instructions will be the same for the majority of parts and components which make up the TQG.

The importance of cleaning must be thoroughly understood by maintenance personnel. Great care and effort are required during cleaning. Dirt and foreign material are a constant threat to satisfactory maintenance. The following should apply to all cleaning, inspection, repair, and assembly operations:

1. Clean all parts before inspection, after repair, and before assembly.

CLEANING INSTRUCTIONS - Continued

2. Hands should be kept free of any accumulation of grease which can collect dust, dirt, and grit.

3. After cleaning, all parts should be covered or wrapped to protect them from dust and dirt.

Castings, Forgings, and Machined Metal Parts

WARNING

Cleaning solvent is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with cleaning solvent. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply can cause injury or death to personnel.

1. Clean inner and outer surfaces with breakthrough cleaning solvent.

2. Remove grease and accumulated deposits with a stiff bristle brush.

WARNING

Cleaning with compressed air can cause flying particles. When using compressed air, wear protective glasses and use clean, low pressure air, less than 30 psi (208 kPa). Failure to comply can cause eye injury to personnel.

3. Blow out all tapped (threaded) holes with compressed air to remove dirt and cleaning fluids.

Electrical Cables and Rubber Components

CAUTION

Do not wash rubber components and electrical cables with breakthrough cleaning solvents or mineral spirits; they will cause serious damage or destroy the material.

Wash electrical cables and rubber components with water and mild soap solution and wipe dry with rag.

INSPECTION INSTRUCTIONS

All components and parts must be carefully checked to determine the following:

1. If they are serviceable for reuse.

2. If they can be repaired.

3. If they must be replaced.

Drilled and Tapped (Threaded) Holes

1. Inspect for wear, distortion, cracks, or any other damage in or around holes.

2. Inspect threaded areas for wear, distortion (stretching), or evidence of cross-threading.

3. Mark all damaged areas for repair or replacement.

INSPECTION INSTRUCTIONS - Continued

Castings, Forgings, and Machined Metal Parts

1. Inspect machined surfaces for nicks, burrs, raised metal, wear, or other damage.
2. Check all inner and outer surfaces for breaks or cracks.
3. Mark all damaged material for repair or replacement.

TAGGING INSTRUCTIONS

When tagging is required during the removal procedure, remove tags during the installation procedure.

REPAIR INSTRUCTIONS

NOTE

Refer to Source, Maintenance, and Recoverability (SMR) Codes assigned to support items listed in the RPSTL (see TM 9-6115-730-24P).

Any repair procedure peculiar to a specific part or component is covered in the work package relating to that item. After repair, clean all parts thoroughly to prevent dirt, metal chips, or other foreign material from entering working parts.

Castings, Forgings, and Machined Metal Parts

1. Minor cracked castings or forgings may possibly be repaired. Refer to TC 9-237.
2. Repair minor damage to machined surfaces with a fine mill file or crocus cloth dipped in breakthrough cleaning solvent.
3. Machined surfaces which are deeply nicked could affect the assembly operation and should be replaced.
4. Minor damage to threaded capscrew holes should be repaired with thread tap of same size to prevent cutting oversize.

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

RIGHT BATTERY ACCESS DOOR ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Personnel Required

One

Materials/Parts

Foam damping sheet (WP 0124, Item 11)
Seal

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

REMOVAL

1. Turn two latches (Figure 1, Item 1) and open right battery access door (Figure 1, Item 2).
2. Remove eight locknuts (Figure 1, Item 3), washers (Figure 1, Item 4), screws (Figure 1, Item 5), and right battery access door (Figure 1, Item 2).
3. If necessary, remove seal.

END OF TASK

DISASSEMBLY

1. Remove seven locknuts (Figure 1, Item 6), screws (Figure 1, Item 7), and hinge (Figure 1, Item 8) from right battery access door (Figure 1, Item 2).
2. Remove eight nuts (Figure 1, Item 9), screws (Figure 1, Item 10), and two latches (Figure 1, Item 1).

DISASSEMBLY - Continued

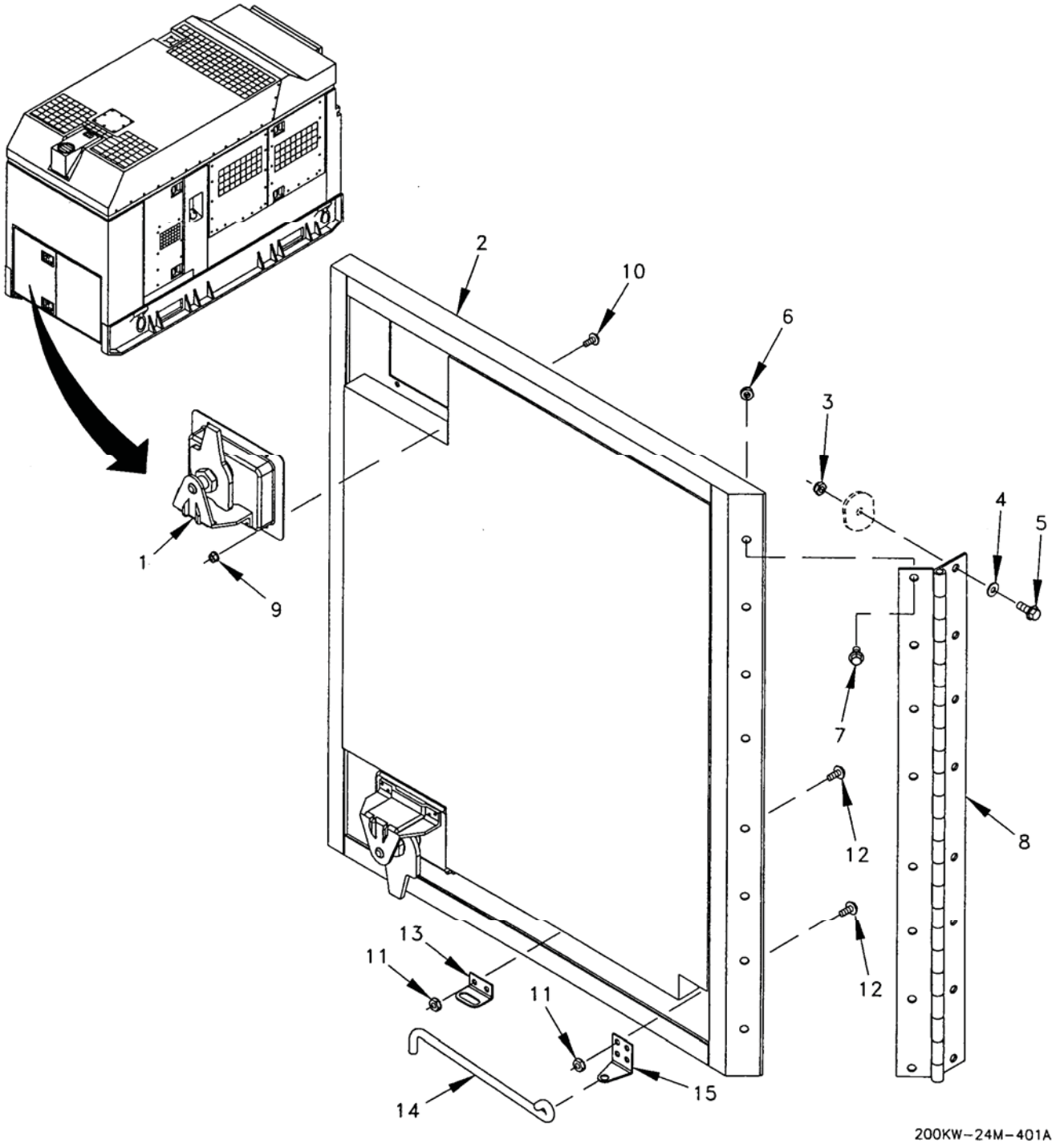

Figure 1. Right Battery Access Door Assembly.

DISASSEMBLY - Continued

3. Remove four nuts (Figure 1, Item 11), screws (Figure 1, Item 12), holding rod bracket (Figure 1, Item 13), door holding rod (Figure 1, Item 14), and door holding bracket.

4. If necessary, remove foam damping.

END OF TASK

ASSEMBLY

1. If necessary, use old foam damping as template to cut new foam damping sheet.

2. Install foam damping.

3. Install door holding bracket (Figure 1, Item 15), door holding rod (Figure 1, Item 14), and holding rod bracket (Figure 1, Item 13) and secure with four screws (Figure 1, Item 12) and nuts (Figure 1, Item 11).

4. Install two latches (Figure 1, Item 1) and secure with eight screws (Figure 1, Item 10) and nuts (Figure 1, Item 9).

5. Install hinge (Figure 1, Item 8) and secure with seven screws (Figure 1, Item 7) and locknuts (Figure 1, Item 6).

END OF TASK

INSTALLATION

1. If removed, replace seal.

2. Install right battery access door (Figure 1, Item 2) and secure with seven screws (Figure 1, Item 5), washers (Figure 1, Item 4), and locknuts (Figure 1, Item 3).

3. Close right battery access door (Figure 1, Item 2) and secure by rotating and closing two latches (Figure 1, Item 1).

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

LEFT BATTERY ACCESS DOOR ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Personnel Required

One

Materials/Parts

Foam damping sheet (WP 0124, Item 11)
Seal

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

REMOVAL

1. Turn two latches (Figure 1, Item 1) and open right and left battery access doors (Figure 1, Item 2) and (Figure 1, Item 3).
2. Remove eight locknuts (Figure 1, Item 4), screws (Figure 1, Item 5), and left battery access door (Figure 1, Item 3).
3. If necessary, remove seal.

END OF TASK

DISASSEMBLY

1. Remove seven locknuts (Figure 1, Item 6), screws (Figure 1, Item 7), and hinge (Figure 1, Item 8) from left battery access door (Figure 1, Item 3).

DISASSEMBLY - Continued

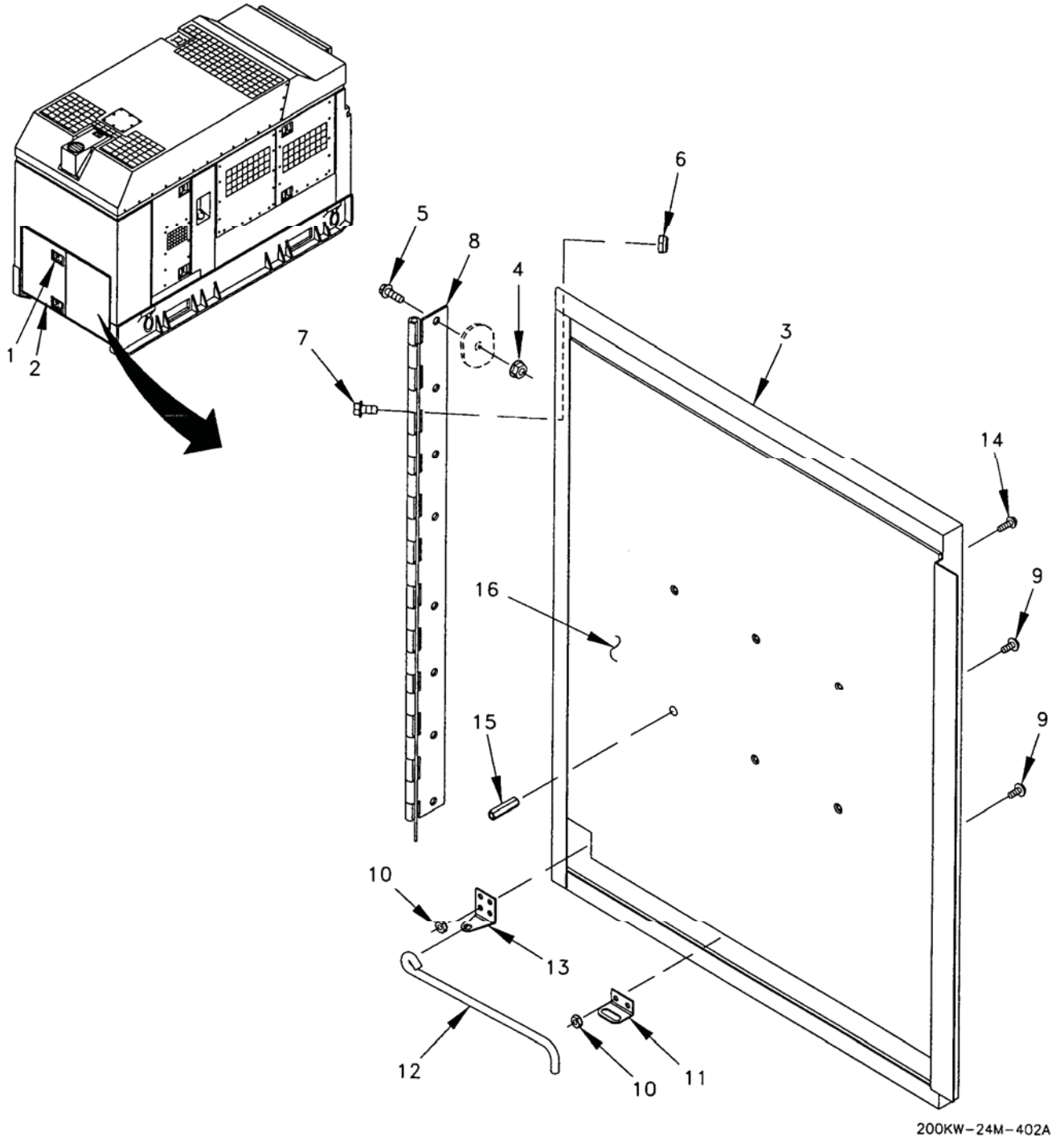

Figure 1. Left Battery Access Door Assembly.

DISASSEMBLY - Continued

2. Remove four screws (Figure 1, Item 9), nuts (Figure 1, Item 10), holding rod bracket (Figure 1, Item 11), door holding rod (Figure 1, Item 12), and door holding bracket (Figure 1, Item 13).

3. If necessary, remove six screws (Figure 1, Item 14), spacers (Figure 1, Item 15), and foam damping (Figure 1, Item 16).

END OF TASK

ASSEMBLY

1. If necessary, use old foam damping as template to cut new foam damping sheet.

2. Install foam damping (Figure 1, Item 16) on left battery access door (Figure 1, Item 3) and secure with six spacers (Figure 1, Item 15) and screws (Figure 1, Item 14).

3. Install door holding bracket (Figure 1, Item 13), door holding rod (Figure 1, Item 12), and holding rod bracket (Figure 1, Item 11) and secure with four nuts (Figure 1, Item 10) and screws (Figure 1, Item 9).

4. Install hinge (Figure 1, Item 8) and secure with seven screws (Figure 1, Item 7) and locknuts (Figure 1, Item 6).

END OF TASK

INSTALLATION

1. If removed, install seal.

2. Install left battery access door (Figure 1, Item 3) and secure with seven screws (Figure 1, Item 5) and locknuts (Figure 1, Item 4).

3. Close left and right battery access doors (Figure 1, Item 3) and (Figure 1, Item 2) and secure by rotating and closing two latches (Figure 1, Item 1).

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

CONTROL BOX DOOR ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Personnel Required

One

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

REMOVAL

1. Turn two latches (Figure 1, Item 1) and open control box door (Figure 1, Item 2).
2. Remove eight lockwashers (Figure 1, Item 3), washers (Figure 1, Item 4), screws (Figure 1, Item 5), and control box door (Figure 1, Item 2).

END OF TASK

DISASSEMBLY

1. Remove eight nuts (Figure 1, Item 6), screws (Figure 1, Item 7), and two latches (Figure 1, Item 1).
2. Remove eight locknuts (Figure 1, Item 8), screws (Figure 1, Item 9), and hinge (Figure 1, Item 10).

END OF TASK

ASSEMBLY

1. Install hinge (Figure 1, Item 10) on control box door (Figure 1, Item 2) and secure with eight screws (Figure 1, Item 9) and locknuts (Figure 1, Item 8).

2. Install two latches (Figure 1, Item 1) and secure with eight screws (Figure 1, Item 7) and nuts (Figure 1, Item 6).

END OF TASK

INSTALLATION

1. Install control box door (Figure 1, Item 2) and secure with eight lockwashers (Figure 1, Item 5), washers (Figure 1, Item 4), and screws (Figure 1, Item 3).

2. Close control box door (Figure 1, Item 2) and secure by rotating and closing two latches (Figure 1, Item 1).

INSTALLATION - Continued

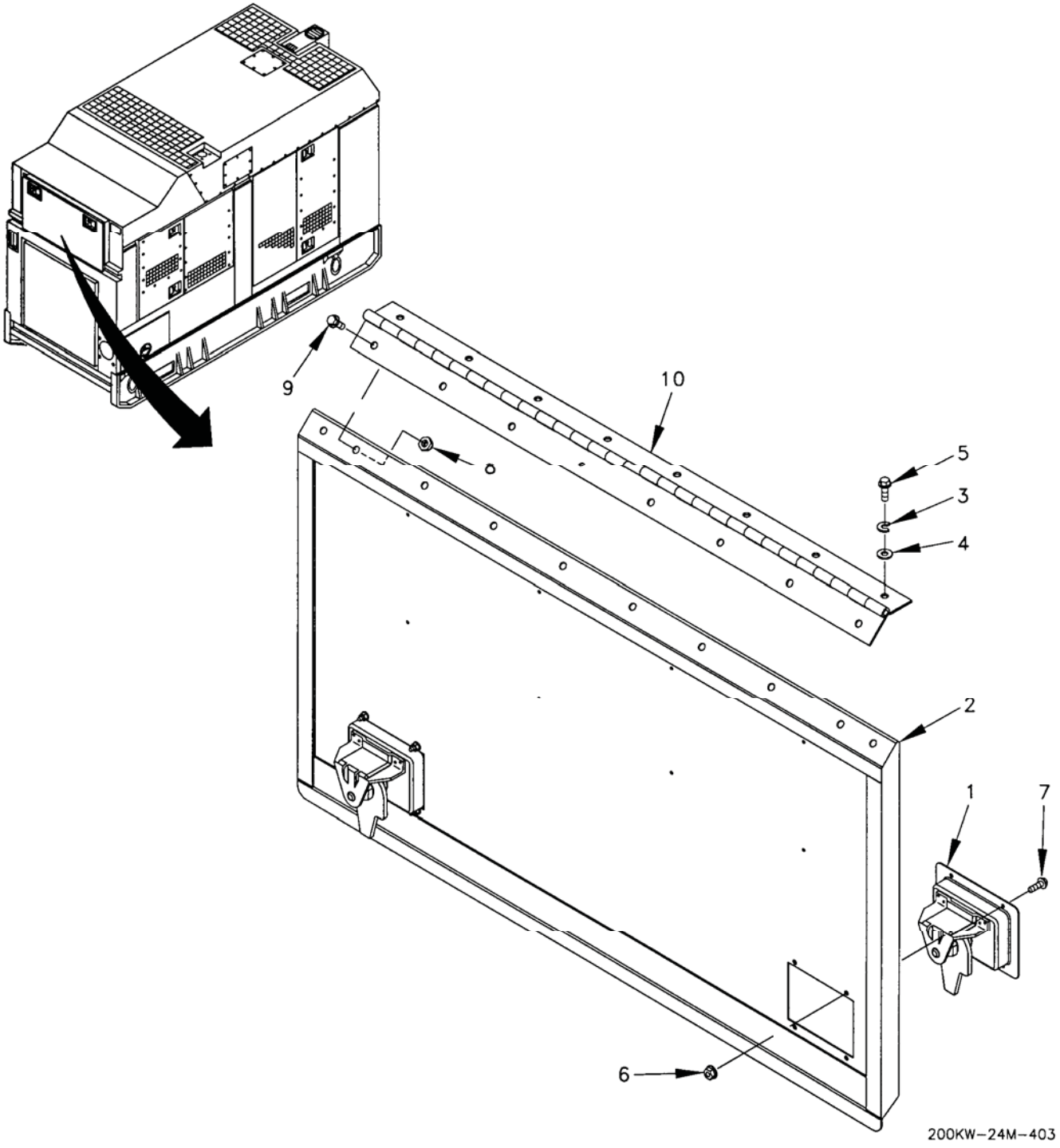

Figure 1. Control Box Door Assembly.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

LEFT FRONT DOOR ASSEMBLY (LATCH) MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Personnel Required

One

Materials/Parts

Foam damping sheet (WP 0124, Item 10)
Foam damping sheet (WP 0124, Item 11)
Seal

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

REMOVAL

1. Turn two latches (Figure 1, Item 1) and open left front door assembly (latch) (Figure 1, Item 2).
2. Remove thirteen screws (Figure 1, Item 3), and lockwashers (Figure 1, Item 4), washers (Figure 1, Item 5), left front door assembly (latch) (Figure 1, Item 2).
3. If necessary, remove seal.

END OF TASK

DISASSEMBLY

1. Remove six foam damping sheets as required.

DISASSEMBLY - Continued

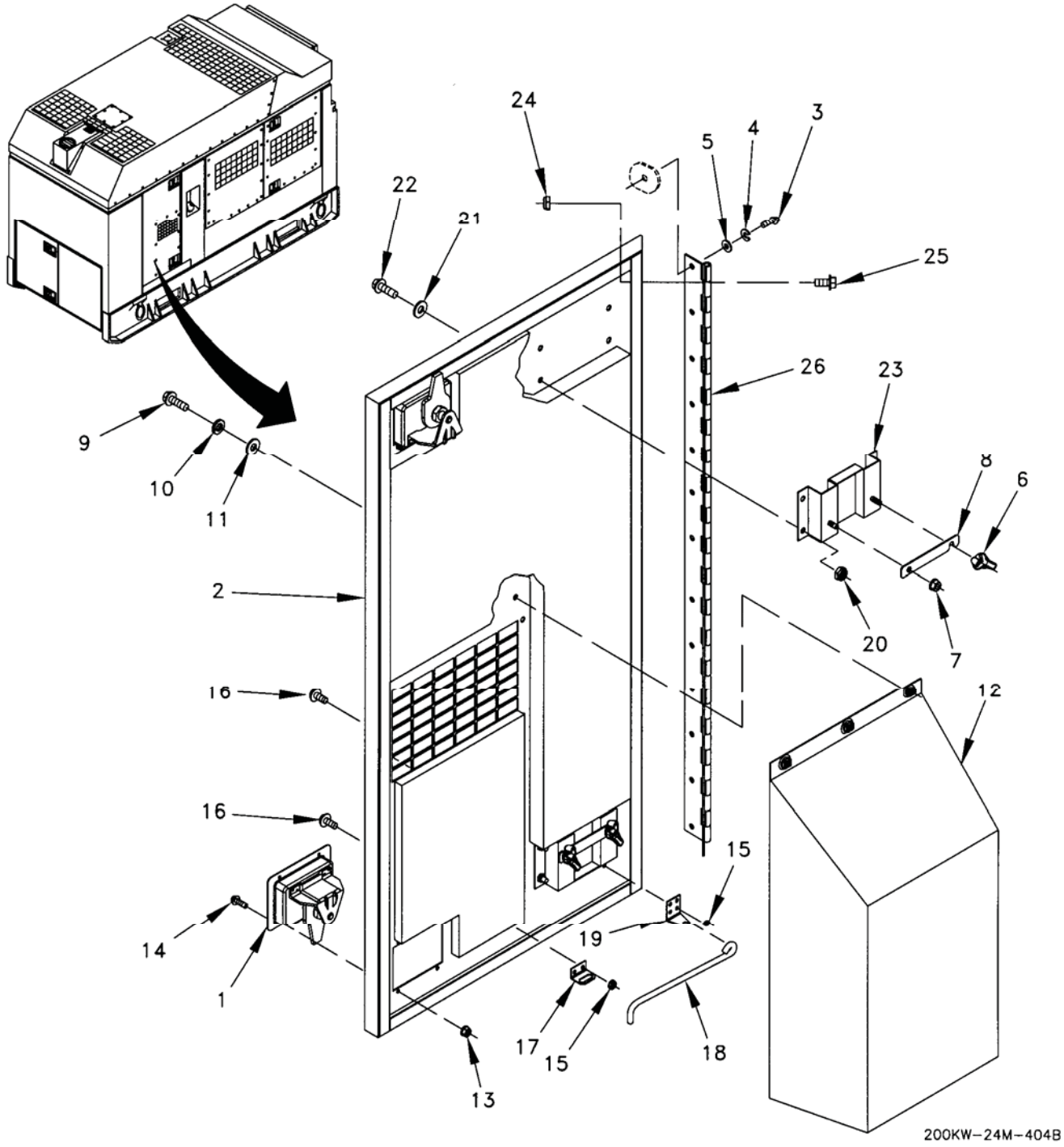

Figure 1. Left Front Door Assembly (Latch).

DISASSEMBLY - Continued

2. Remove two wing nuts (Figure 1, Item 6) and two locknuts (Figure 1, Item 7) and two rod retainer latches (Figure 1, Item 8).

3. Remove eleven screws (Figure 1, Item 9), lockwashers (Figure 1, Item 10), washers (Figure 1, Item 11), and duct (Figure 1, Item 12).

4. Remove eight nuts (Figure 1, Item 13), screws (Figure 1, Item 14), and two latches (Figure 1, Item 1).

5. Remove four nuts (Figure 1, Item 15), screws (Figure 1, Item 16), holding rod bracket (Figure 1, Item 17), door holding rod (Figure 1, Item 18), and door holding bracket (Figure 1, Item 19).

6. Remove eight locknuts (Figure 1, Item 20), screws (Figure 1, Item 22), washers (Figure 1, Item 21), and two rod retainer brackets (Figure 1, Item 23).

7. Remove thirteen locknuts (Figure 1, Item 24), screws (Figure 1, Item 25), and hinge (Figure 1, Item 26).

END OF TASK

ASSEMBLY

1. Install hinge (Figure 1, Item 26) and secure with thirteen screws (Figure 1, Item 25) and locknuts (Figure 1, Item 24).

2. Install two latches (Figure 1, Item 1) and secure with eight screws (Figure 1, Item 14) and nuts (Figure 1, Item 13).

3. Install two rod retainer brackets (Figure 1, Item 23) and secure with eight screws (Figure 1, Item 22), washers (Figure 1, Item 21), and locknuts (Figure 1, Item 20).

4. Install door holding bracket (Figure 1, Item 19), door holding rod (Figure 1, Item 18), holding rod bracket (Figure 1, Item 17) and secure with four screws (Figure 1, Item 16) and nuts (Figure 1, Item 15).

5. Install duct (Figure 1, Item 12) and secure with eleven washers (Figure 1, Item 11), lockwashers (Figure 1, Item 10), and screws (Figure 1, Item 9).

6. Install two rod retainer latches (Figure 1, Item 8) and secure with two locknuts (Figure 1, Item 7) and two wing nuts (Figure 1, Item 6).

7. If necessary, use old foam damping sheets as templates to cut new foam damping sections.

8. Install six foam damping sheets.

END OF TASK

INSTALLATION

1. If necessary, install seal.

2. Install left front door assembly (latch) (Figure 1, Item 2) and secure with thirteen screws (Figure 1, Item 3), lockwashers (Figure 1, Item 4), and washers (Figure 1, Item 5).

3. Close left front door assembly (latch) (Figure 1, Item 2) and secure by rotating and closing two latches (Figure 1, Item 1).

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

LEFT REAR DOOR ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools	Personnel Required
Tool Kit, General Mechanic's (WP 0123, Item 1)	One
Materials/Parts	**References**
Foam damping sheet (WP 0124, Item 10) Seal	TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

REMOVAL

1. Turn two latches (Figure 1, Sheet 1, Item 1) and open left rear doors (Figure 1, Sheet 1, Item 2) and (Figure 1, Sheet 1, Item 3).
2. Remove ten screws (Figure 1, Sheet 1, Item 4), lockwashers (Figure 1, Sheet 1, Item 5), washers (Figure 1, Sheet 1, Item 6), and left rear door assembly (Figure 1, Sheet 1, Item 3).
3. If necessary, remove seal.

END OF TASK

DISASSEMBLY

1. Remove fifteen screws (Figure 1, Sheet 1, Item 10), lockwashers (Figure 1, Sheet 1, Item 11), washers (Figure 1, Sheet 1, Item 12), duct (Figure 1, Sheet 1, Item 13), and door holding rod (Figure 1, Sheet 1, Item 14).

DISASSEMBLY - Continued

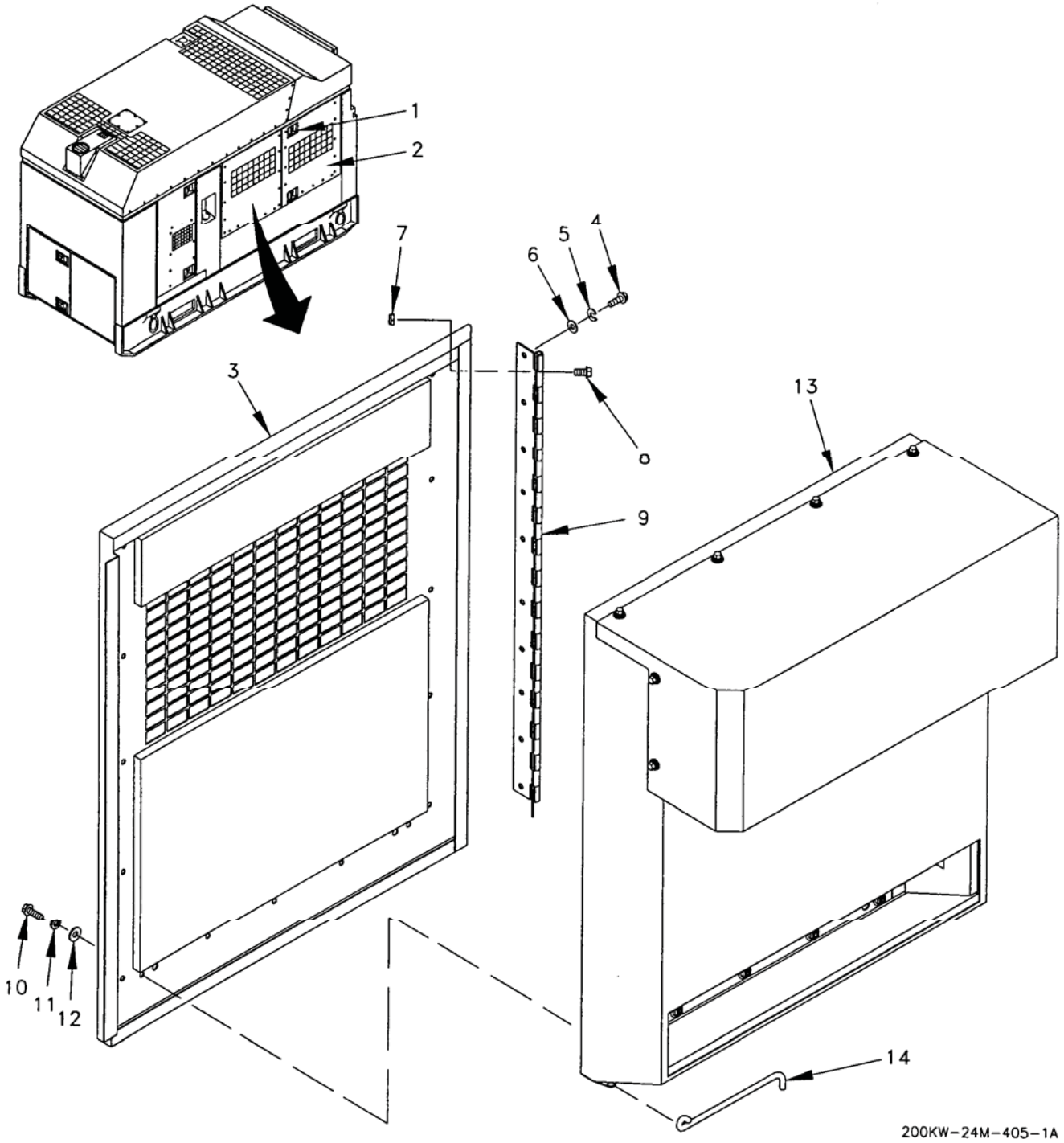

Figure 1. Left Rear Door Assembly (Sheet 1 of 2).

DISASSEMBLY - Continued

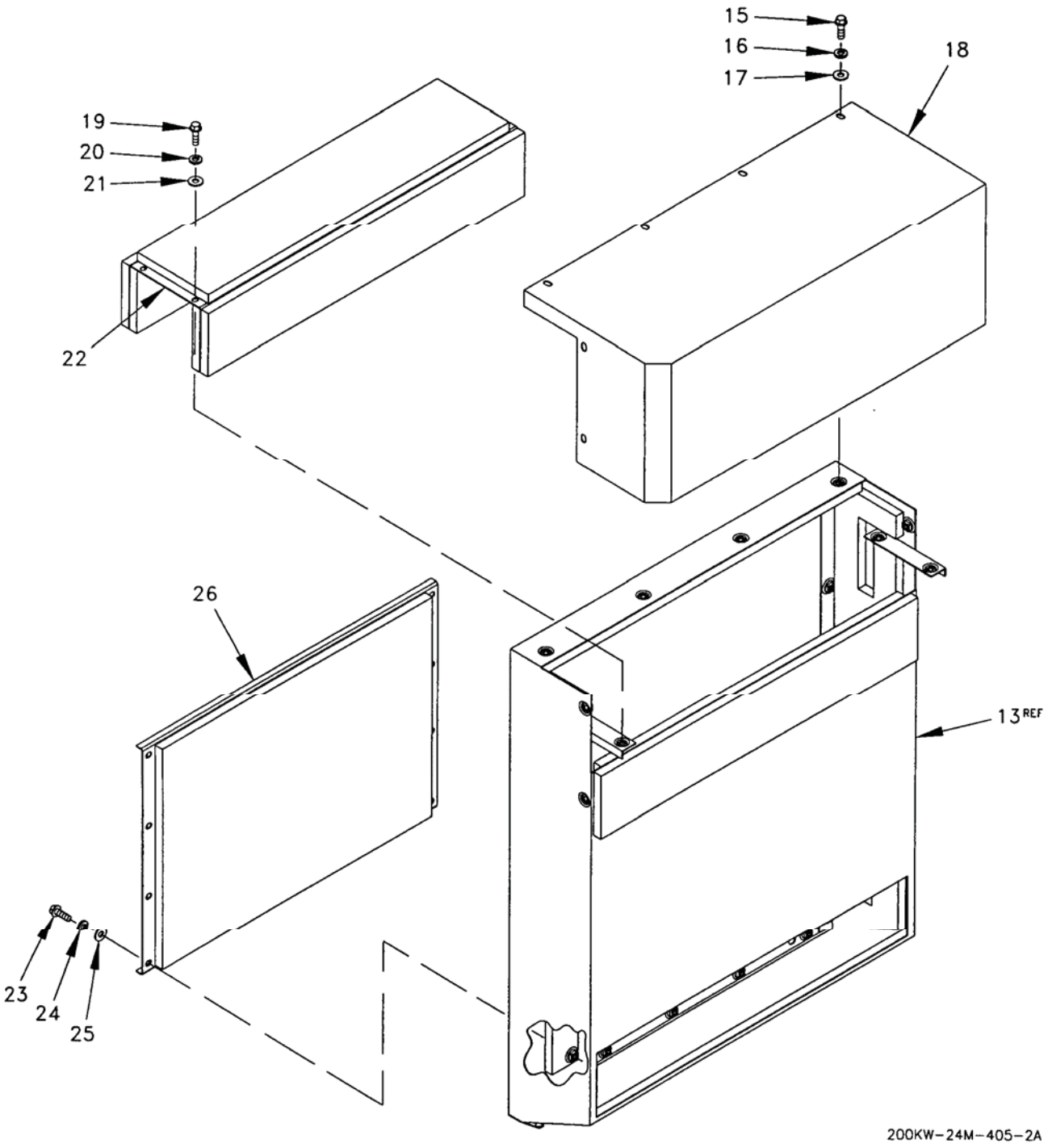

Figure 1. Left Rear Door Assembly (Sheet 2 of 2).

DISASSEMBLY - Continued

2. Remove eight screws (Figure 1, Sheet 2, Item 15), lockwashers (Figure 1, Sheet 2, Item 16), washers (Figure 1, Sheet 2, Item 17), and deflector (Figure 1, Sheet 2, Item 18).

3. Remove four screws (Figure 1, Sheet 2, Item 19), lockwashers (Figure 1, Sheet 2, Item 20), washers (Figure 1, Sheet 2, Item 21), and baffle (Figure 1, Sheet 2, Item 22).

4. Remove eight screws (Figure 1, Sheet 2, Item 23), lockwashers (Figure 1, Sheet 2, Item 24), washers (Figure 1, Sheet 2, Item 25), and baffle (Figure 1, Sheet 2, Item 26).

5. Remove twenty foam damping sheets as required.

6. Remove ten locknuts (Figure 1, Sheet 1, Item 7), screws (Figure 1, Sheet 1, Item 8), and hinge (Figure 1, Sheet 1, Item 9).

END OF TASK

ASSEMBLY

1. If necessary, use old foam damping sheets as templates to cut new foam damping sections.

2. Install twenty foam damping sheets.

3. Install baffle (Figure 1, Sheet 2, Item 26) on duct (Figure 1, Sheet 1, Item 13), and secure with four washers (Figure 1, Sheet 2, Item 25), lockwashers (Figure 1, Sheet 2, Item 24), and screws (Figure 1, Sheet 2, Item 23).

4. Install baffle (Figure 1, Sheet 2, Item 22) on duct (Figure 1, Sheet 1, Item 13), and secure with four washers (Figure 1, Sheet 2, Item 21), lockwashers (Figure 1, Sheet 2, Item 20), and screws (Figure 1, Sheet 2, Item 19).

5. Install deflector (Figure 1, Sheet 2, Item 18) on duct (Figure 1, Sheet 1, Item 13), and secure with four washers (Figure 1, Sheet 2, Item 17), lockwashers (Figure 1, Sheet 2, Item 16), and screws (Figure 1, Sheet 2, Item 15).

6. Install duct (Figure 1, Sheet 1, Item 13) on rear door assembly (Figure 1, Sheet 1, Item 3) and secure with fifteen washers (Figure 1, Sheet 1, Item 12), lockwashers (Figure 1, Sheet 1, Item 11), and screws (Figure 1, Sheet 1, Item 10). Install door holding rod (Figure 1, Sheet 1, Item 14).

7. Install hinge (Figure 1, Sheet 1, Item 9), and secure with ten screws (Figure 1, Sheet 1, Item 8), and locknuts (Figure 1, Sheet 1, Item 7).

END OF TASK

INSTALLATION

1. If necessary, install seal.

2. Install left rear door assembly (Figure 1, Sheet 1, Item 3) and secure with ten washers (Figure 1, Sheet 1, Item 6), lockwashers (Figure 1, Sheet 1, Item 5), and screws (Figure 1, Sheet 1, Item 4).

3. Close left rear doors (Figure 1, Sheet 1, Item 3) and (Figure 1, Sheet 1, Item 2), and secure by rotating two latches (Figure 1, Sheet 1, Item 1).

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

LEFT REAR DOOR ASSEMBLY (LATCH) MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Personnel Required

One

Materials/Parts

Foam damping sheet (WP 0124, Item 10)
Seal

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

REMOVAL

1. Turn two latches (Figure 1, Sheet 1, Item 1) and open left rear door assembly (latch) (Figure 1, Sheet 1, Item 2).
2. Remove ten lockwashers (Figure 1, Sheet 1, Item 3), washers (Figure 1, Sheet 1, Item 4), screws (Figure 1, Sheet 1, Item 5), and left rear door assembly (latch) (Figure 1, Sheet 1, Item 2).
3. If necessary, remove seal.

END OF TASK

DISASSEMBLY

1. Remove eight nuts (Figure 1, Sheet 1, Item 9), screws (Figure 1, Sheet 1, Item 10), and two latches (Figure 1, Sheet 1, Item 1).

DISASSEMBLY - Continued

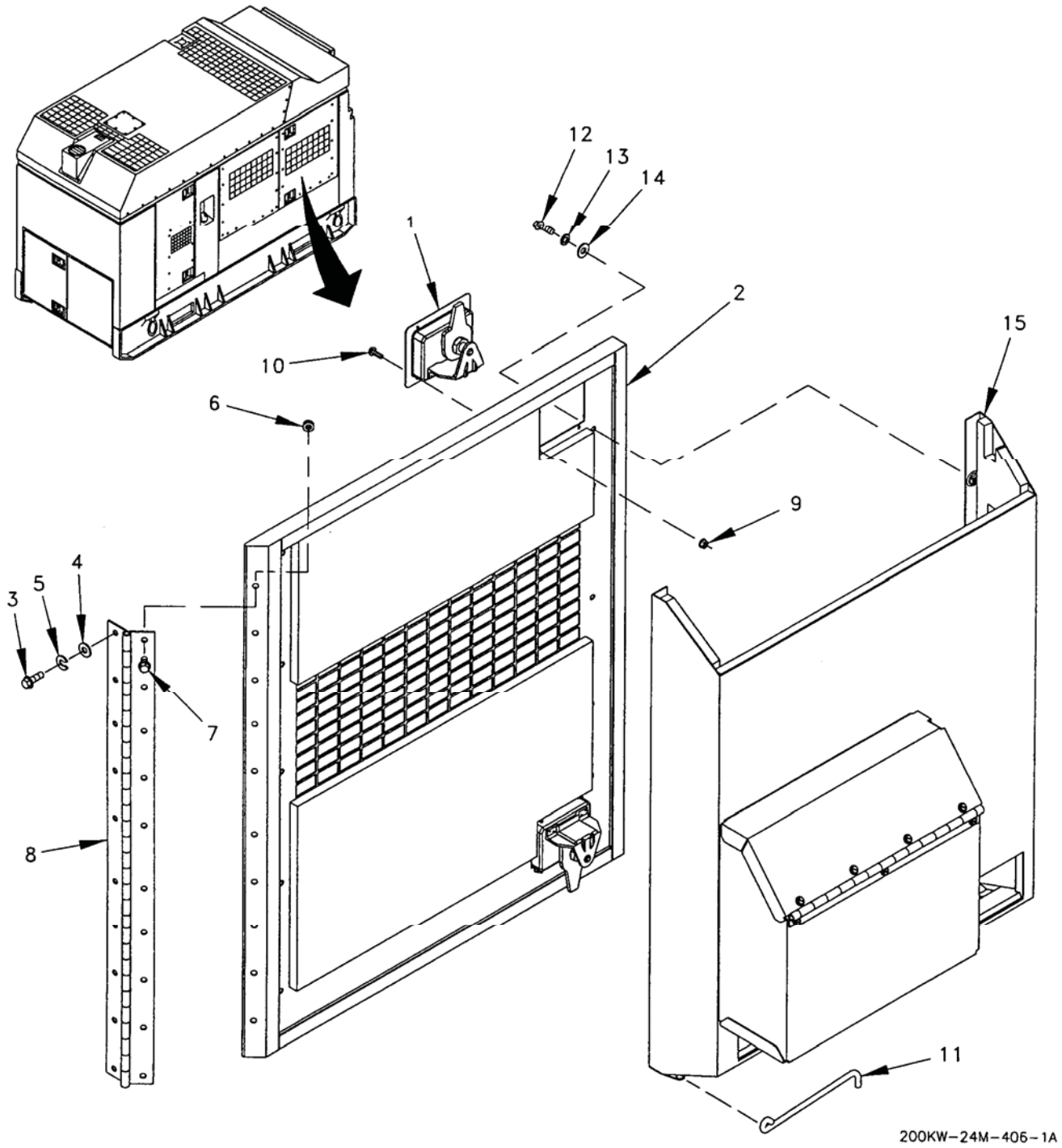

Figure 1. Left Rear Door Assembly (Latch) (Sheet 1 of 2).

DISASSEMBLY - Continued

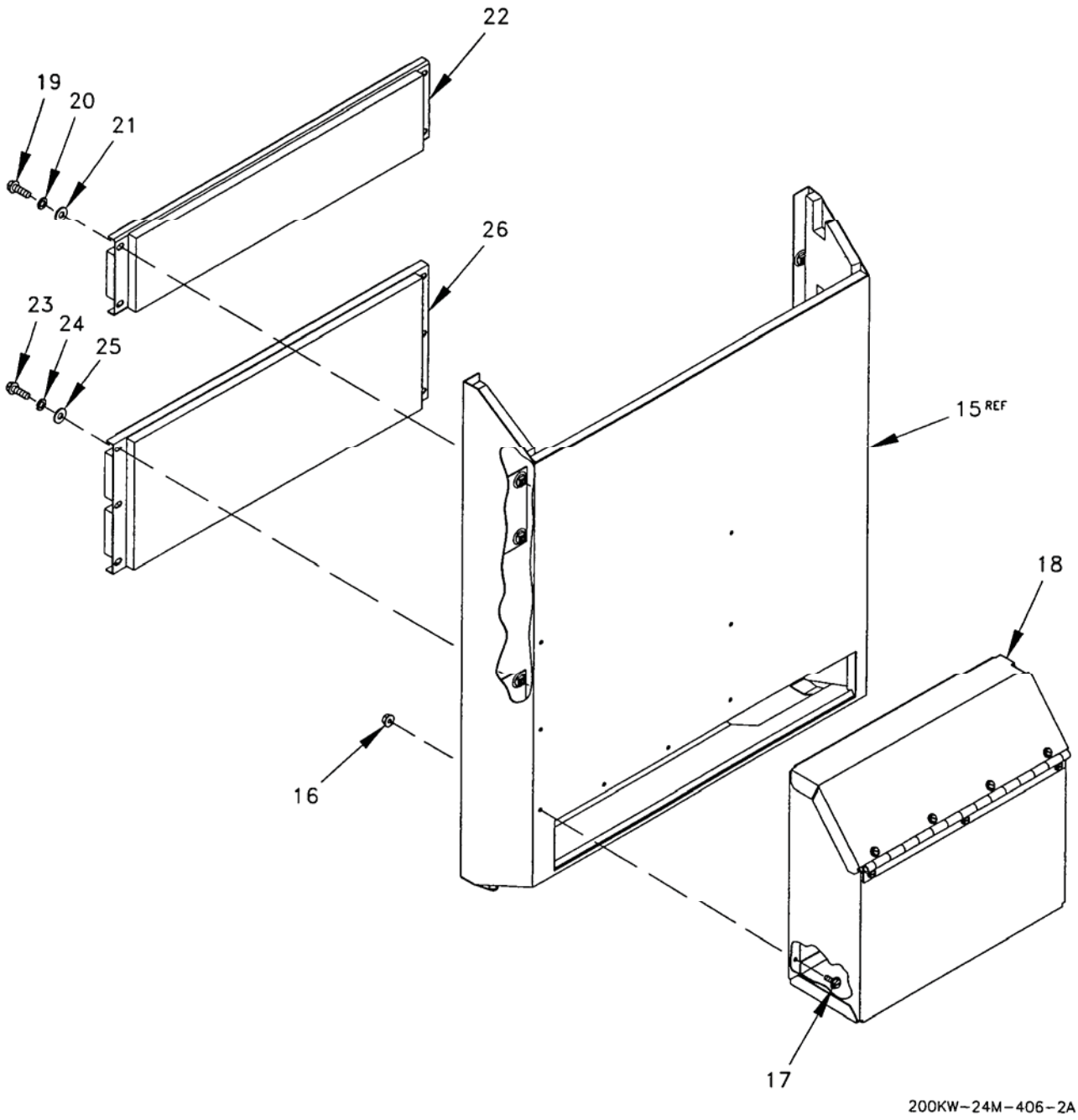

Figure 1. Left Rear Door Assembly (Latch) (Sheet 2 of 2).

DISASSEMBLY - Continued

2. Remove door holding rod (Figure 1, Sheet 1, Item 11).

3. Remove 14 screws (Figure 1, Sheet 1, Item 12), washers (Figure 1, Sheet 1, Item 13), lockwashers (Figure 1, Sheet 1, Item 14), and duct (Figure 1, Sheet 1, Item 15).

4. Remove eight nuts (Figure 1, Sheet 2, Item 16), screws (Figure 1, Sheet 2, Item 17), and storage box (Figure 1, Sheet 2, Item 18).

5. Remove four screws (Figure 1, Sheet 2, Item 19), washers (Figure 1, Sheet 2, Item 20), lockwashers (Figure 1, Sheet 2, Item 21), and baffle (Figure 1, Sheet 2, Item 22).

6. Remove six screws (Figure 1, Sheet 2, Item 23), washers (Figure 1, Sheet 2, Item 24), lockwashers (Figure 1, Sheet 2, Item 25), and baffle (Figure 1, Sheet 2, Item 26).

7. Remove nine foam damping sheets as required.

8. Remove ten locknuts (Figure 1, Sheet 1, Item 6), screws (Figure 1, Sheet 1, Item 7), and hinge (Figure 1, Sheet 1, Item 8).

END OF TASK

ASSEMBLY

1. Install hinge (Figure 1, Sheet 1, Item 8) and secure with ten screws (Figure 1, Sheet 1, Item 7), and locknuts (Figure 1, Sheet 1, Item 6).

2. If necessary, use old foam damping sheets as templates to cut new foam damping sections.

3. Install nine foam damping sheets.

4. Install baffle (Figure 1, Sheet 2, Item 26) on duct (Figure 1, Sheet 1, Item 15) and secure with six lockwashers (Figure 1, Sheet 2, Item 25), washers (Figure 1, Sheet 2, Item 24), and screws (Figure 1, Sheet 2, Item 23).

5. Install baffle (Figure 1, Sheet 2, Item 22) on duct (Figure 1, Sheet 1, Item 15) and secure with four lockwashers (Figure 1, Sheet 2, Item 21), washers (Figure 1, Sheet 2, Item 20), and screws (Figure 1, Sheet 2, Item 19).

6. Install storage box (Figure 1, Sheet 2, Item 18) on duct (Figure 1, Sheet 1, Item 15) and secure with eight screws (Figure 1, Sheet 2, Item 17) and nuts (Figure 1, Sheet 2, Item 16).

7. Install duct (Figure 1, Sheet 1, Item 15) and secure with 14 lockwashers (Figure 1, Sheet 1, Item 14), washers (Figure 1, Sheet 1, Item 13), and screws (Figure 1, Sheet 1, Item 12).

8. Install door holding rod (Figure 1, Sheet 1, Item 11).

9. Install two latches (Figure 1, Sheet 1, Item 1) and secure with eight screws (Figure 1, Sheet 1, Item 10) and nuts (Figure 1, Sheet 1, Item 9).

END OF TASK

INSTALLATION

1. Install left rear door assembly (latch) (Figure 1, Sheet 1, Item 2) and secure with ten screws (Figure 1, Sheet 1, Item 5), washers (Figure 1, Sheet 1, Item 4), and lockwashers (Figure 1, Sheet 1, Item 3).

2. Close left rear door assembly (latch) (Figure 1, Sheet 1, Item 2) and secure by rotating two latches (Figure 1, Sheet 1, Item 1).

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

LOAD BOARD DOOR ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Personnel Required

One

Materials/Parts

Foam damping sheet (WP 0124, Item 10)
Foam damping sheet (WP 0124, Item 11)

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

REMOVAL

1. Turn latch (Figure 1, Item 1) and open load board door assembly (Figure 1, Item 2).
2. Remove four screws (Figure 1, Item 3), washers (Figure 1, Item 4), lockwashers (Figure 1, Item 5), and load board door assembly (Figure 1, Item 2).

END OF TASK

DISASSEMBLY

1. Remove three nuts (Figure 1, Item 6) and screws (Figure 1, Item 7).
2. Remove four nuts (Figure 1, Item 8), screws (Figure 1, Item 9), and latch (Figure 1, Item 1).
3. Remove nut (Figure 1, Item 10), screw (Figure 1, Item 11), wrench (Figure 1, Item 12), cord (Figure 1, Item 13), and hinge (Figure 1, Item 14).

DISASSEMBLY - Continued

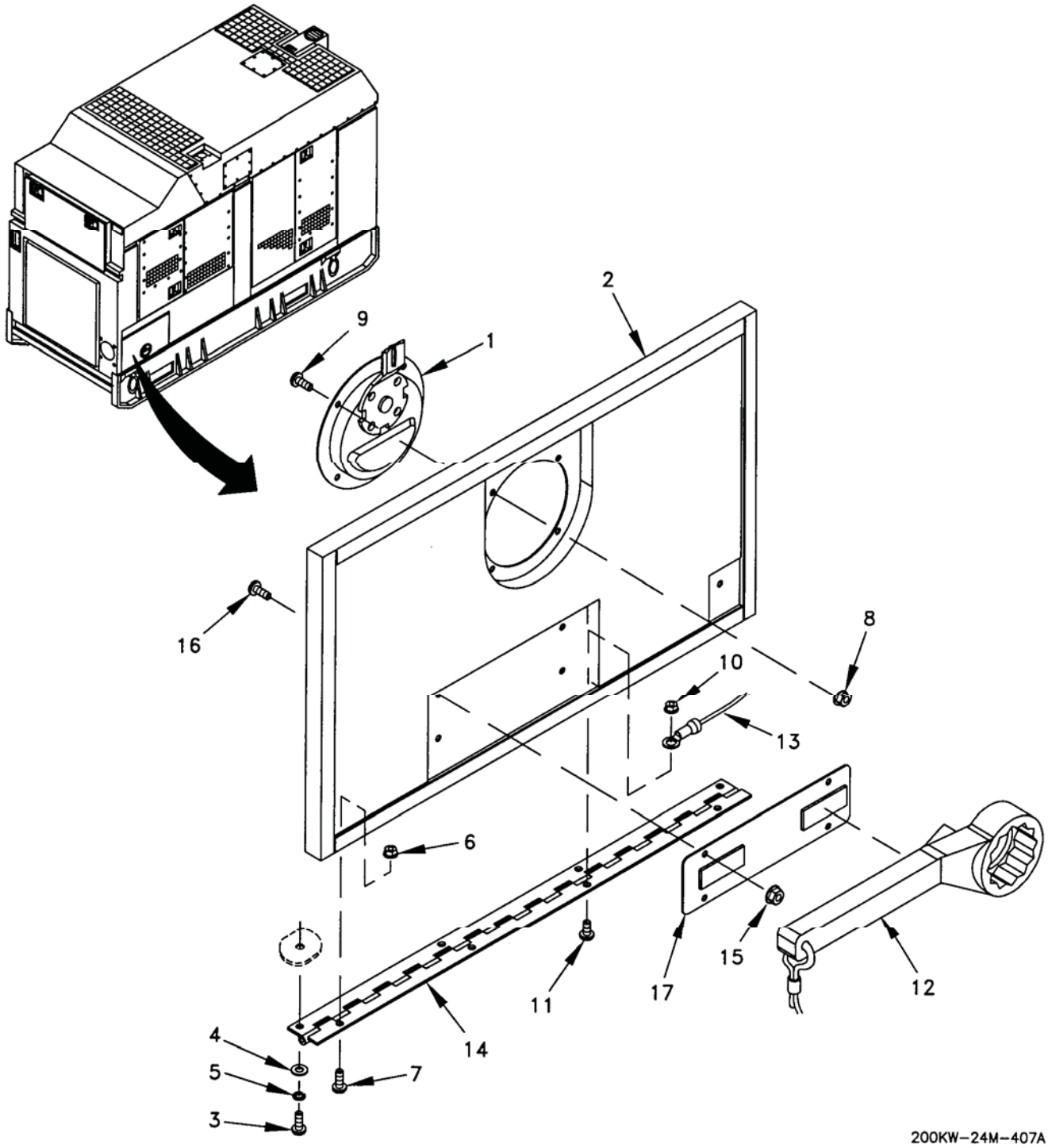

Figure 1. Load Board Door Assembly.

DISASSEMBLY - Continued

4. Remove four nuts (Figure 1, Item 15), screws (Figure 1, Item 16), and wrench mounting plate (Figure 1, Item 17).

5. Remove foam damping sheets as required.

END OF TASK

ASSEMBLY

1. If necessary, use old foam damping sheets as template to cut new foam damping sheets.

2. Install foam damping sheets.

3. Install wrench mounting plate (Figure 1, Item 17), four screws (Figure 1, Item 16), and nuts (Figure 1, Item 15).

4. Install hinge (Figure 1, Item 14), cord (Figure 1, Item 13) and wrench (Figure 1, Item 12), and secure with screw (Figure 1, Item 11) and nut (Figure 1, Item 10).

5. Install latch (Figure 1, Item 1) and secure with four screws (Figure 1, Item 9) and nuts (Figure 1, Item 8).

6. Install three screws (Figure 1, Item 7) and nuts (Figure 1, Item 6).

END OF TASK

INSTALLATION

1. Install load board door assembly (Figure 1, Item 2) and secure with four lockwashers (Figure 1, Item 5), washers (Figure 1, Item 4), and screws (Figure 1, Item 3).

2. Close load board door assembly (Figure 1, Item 2) and secure by rotating and closing latch (Figure 1, Item 1).

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

RIGHT FRONT DOOR ASSEMBLY (LATCH) MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Personnel Required

One

Materials/Parts

Foam damping sheet (WP 0124, Item 10)
Foam damping sheet (WP 0124, Item 11)

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

REMOVAL

1. Turn two latches (Figure 1, Item 1) and open right front door assembly (latch) (Figure 1, Item 2).
2. Remove thirteen screws (Figure 1, Item 3), washers (Figure 1, Item 4), lockwashers (Figure 1, Item 5), and right front door assembly (latch) (Figure 1, Item 2).

END OF TASK

DISASSEMBLY

1. Remove thirteen locknuts (Figure 1, Item 6), screws (Figure 1, Item 7), and hinge (Figure 1, Item 8) from right front door assembly (latch) (Figure 1, Item 2).
2. Remove eight nuts (Figure 1, Item 9), screws (Figure 1, Item 10), and two latches (Figure 1, Item 1).
3. Remove four nuts (Figure 1, Item 11), screws (Figure 1, Item 12), door holding bracket (Figure 1, Item 13), door holding rod (Figure 1, Item 14), and holding rod bracket (Figure 1, Item 15).

DISASSEMBLY - Continued

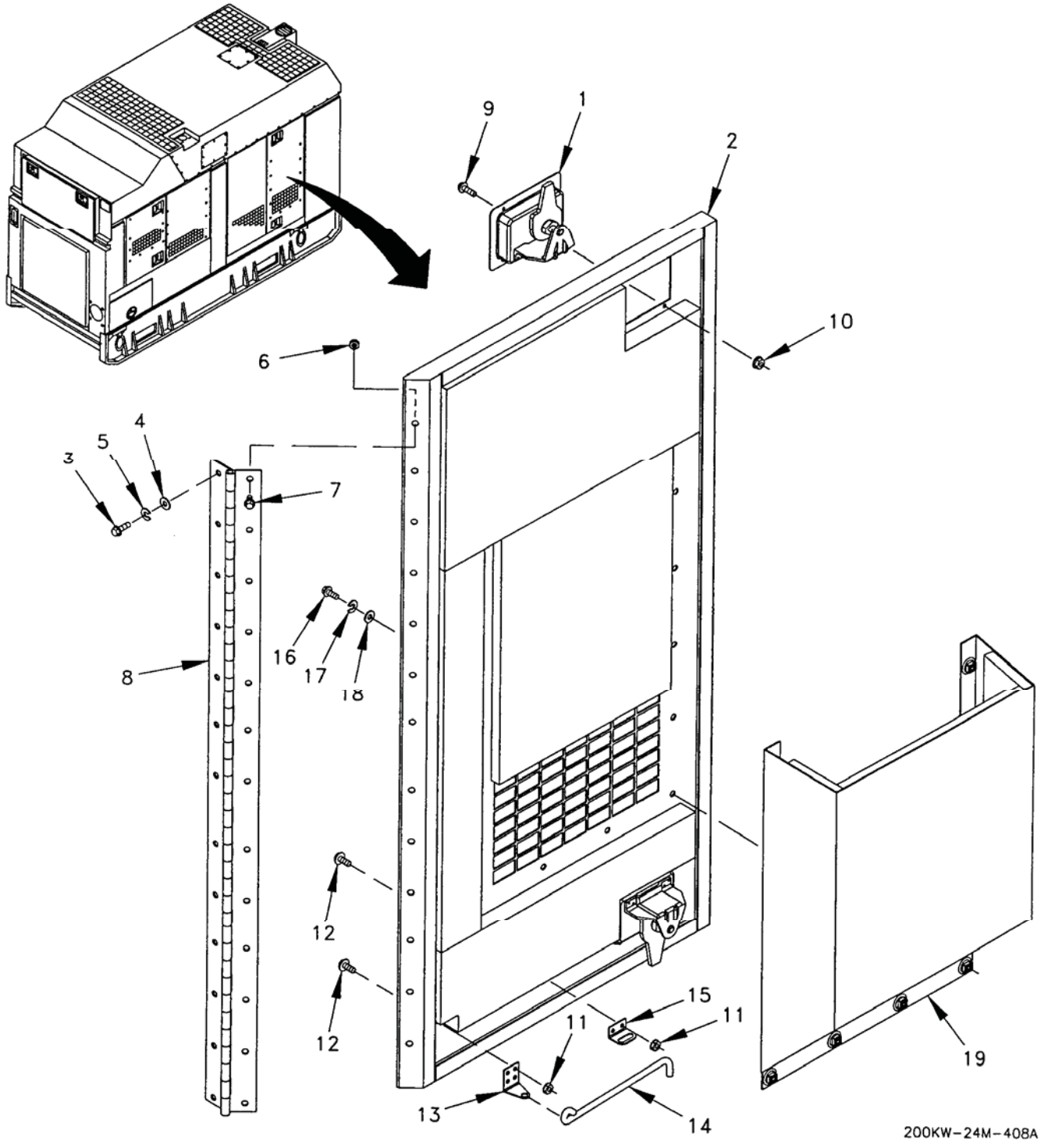

Figure 1. Right Front Door Assembly (Latch).

DISASSEMBLY - Continued

4. Remove twelve screws (Figure 1, Item 16), washers (Figure 1, Item 17), lockwashers (Figure 1, Item 18), and duct (Figure 1, Item 19).

5. Remove eight foam damping sheets as required.

END OF TASK

ASSEMBLY

1. If necessary, use old foam damping sheets as templates to cut new foam damping sheets.

2. Install eight damping sheets.

3. Install duct (Figure 1, Item 19) and secure with twelve lockwashers (Figure 1, Item 18), washers (Figure 1, Item 17), and screws (Figure 1, Item 16).

4. Install holding rod bracket (Figure 1, Item 15), door holding rod (Figure 1, Item 14), door holding bracket (Figure 1, Item 13), and secure with four screws (Figure 1, Item 12), and nuts (Figure 1, Item 11).

5. Install two latches (Figure 1, Item 1) and secure with eight screws (Figure 1, Item 10) and nuts (Figure 1, Item 9).

6. Install hinge (Figure 1, Item 8) and secure with thirteen screws (Figure 1, Item 7) and locknuts (Figure 1, Item 6).

END OF TASK

INSTALLATION

1. Install right front door assembly (latch) (Figure 1, Item 2) and secure with thirteen lockwashers (Figure 1, Item 5), washers (Figure 1, Item 4), and screws (Figure 1, Item 3).

2. Close right front door assembly (latch) (Figure 1, Item 2) and secure by rotating and closing two latches (Figure 1, Item 1).

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

RIGHT FRONT DOOR ASSEMBLY AND STORAGE BOX ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools	Personnel Required
Tool Kit, General Mechanic's (WP 0123, Item 1)	One
Materials/Parts	**References**
Foam damping sheet (WP 0124, Item 11)	TM 9-6115-730-24P

WARNINGS

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High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

REMOVAL

Right Front Door Assembly

1. Turn two latches (Figure 1, Item 1) and open right front doors (Figure 1, Item 2) and (Figure 1, Item 3).
2. Remove thirteen screws (Figure 1, Item 4), washers (Figure 1, Item 5), lockwashers (Figure 1, Item 6), and right front door assembly (Figure 1, Item 3).
3. Remove seal as required.

REMOVAL - Continued

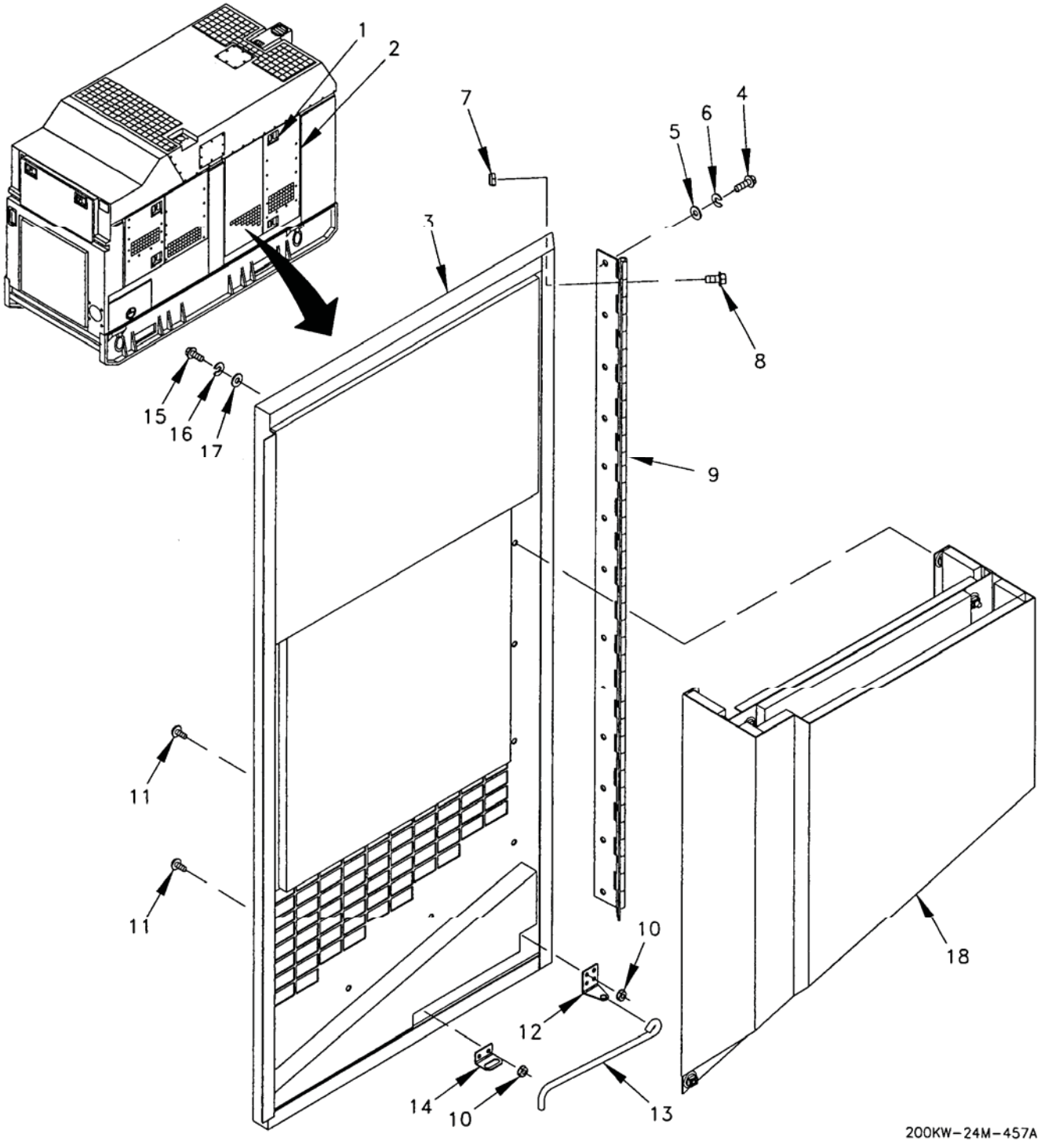

Figure 1. Right Front Door Assembly.

END OF TASK

DISASSEMBLY

Right Front Door Assembly

1. Remove twelve screws (Figure 1, Item 15), washers (Figure 1, Item 16), lockwashers (Figure 1, Item 17), and duct (Figure 1, Item 18).

2. Remove four nuts (Figure 1, Item 10), screws (Figure 1, Item 11), door holding bracket (Figure 1, Item 12), door holding rod (Figure 1, Item 13), and holding rod bracket (Figure 1, Item 14).

3. Remove thirteen locknuts (Figure 1, Item 7), screws (Figure 1, Item 8), and hinge (Figure 1, Item 9) from right front door assembly (Figure 1, Item 3).

4. Remove six foam damping sheets as required.

END OF TASK

ASSEMBLY

Right Front Door Assembly

1. Install hinge (Figure 1, Item 9) and secure with thirteen screws (Figure 1, Item 8) and locknuts (Figure 1, Item 7).

2. Install seal as required.

3. If necessary, use old foam damping sheets as templates to cut new foam damping sheets.

4. Install six damping sheets.

5. Install duct (Figure 1, Item 18) on right front door assembly (Figure 1, Item 3), and secure with eighteen lockwashers (Figure 1, Item 17), washers (Figure 1, Item 16), and screws (Figure 1, Item 15).

6. Install holding rod bracket (Figure 1, Item 14), door holding rod (Figure 1, Item 13), door holding bracket (Figure 1, Item 12), and secure with four screws (Figure 1, Item 11) and nuts (Figure 1, Item 10).

END OF TASK

INSTALLATION

Right Front Door Assembly

1. Install right front door assembly (Figure 1, Item 3) and secure with thirteen lockwashers (Figure 1, Item 6), washers (Figure 1, Item 5), and screws (Figure 1, Item 4).

2. Close right front doors (Figure 1, Item 3) and (Figure 1, Item 2) and secure by rotating and closing two latches (Figure 1, Item 1).

END OF TASK

REMOVAL

Storage Box Assembly

1. Open right front generator housing doors.
2. Remove six screws (Figure 1, Item 1), and storage box assembly (Figure 1, Item 2).

END OF TASK

DISASSEMBLY

Storage Box Assembly

1. Remove screws (Figure 2, Item 3), nut (Figure 2, Item 4), and latch (Figure 2, Item 5).
2. Remove four screws (Figure 2, Item 6), nuts (Figure 2, Item 7), and storage box door (Figure 2, Item 8).
3. Remove three nuts (Figure 2, Item 9), screws (Figure 2, Item 10), and hinge (Figure 2, Item 11).

END OF TASK

ASSEMBLY

Storage Box Assembly

1. Install hinge (Figure 2, Item 11) and secure with three screws (Figure 2, Item 10) and nuts (Figure 2, Item 9).
2. Install storage box door (Figure 2, Item 8) using four screws (Figure 2, Item 6), nuts (Figure 2, Item 7).
3. Install latch (Figure 2, Item 5), and secure with screw (Figure 2, Item 3) and nut (Figure 2, Item 4).

END OF TASK

INSTALLATION

Storage Box Assembly

1. Install storage box assembly (Figure 2, Item 2) using six screws (Figure 2, Item 1).
2. Close right front generator set housing doors.

INSTALLATION - Continued

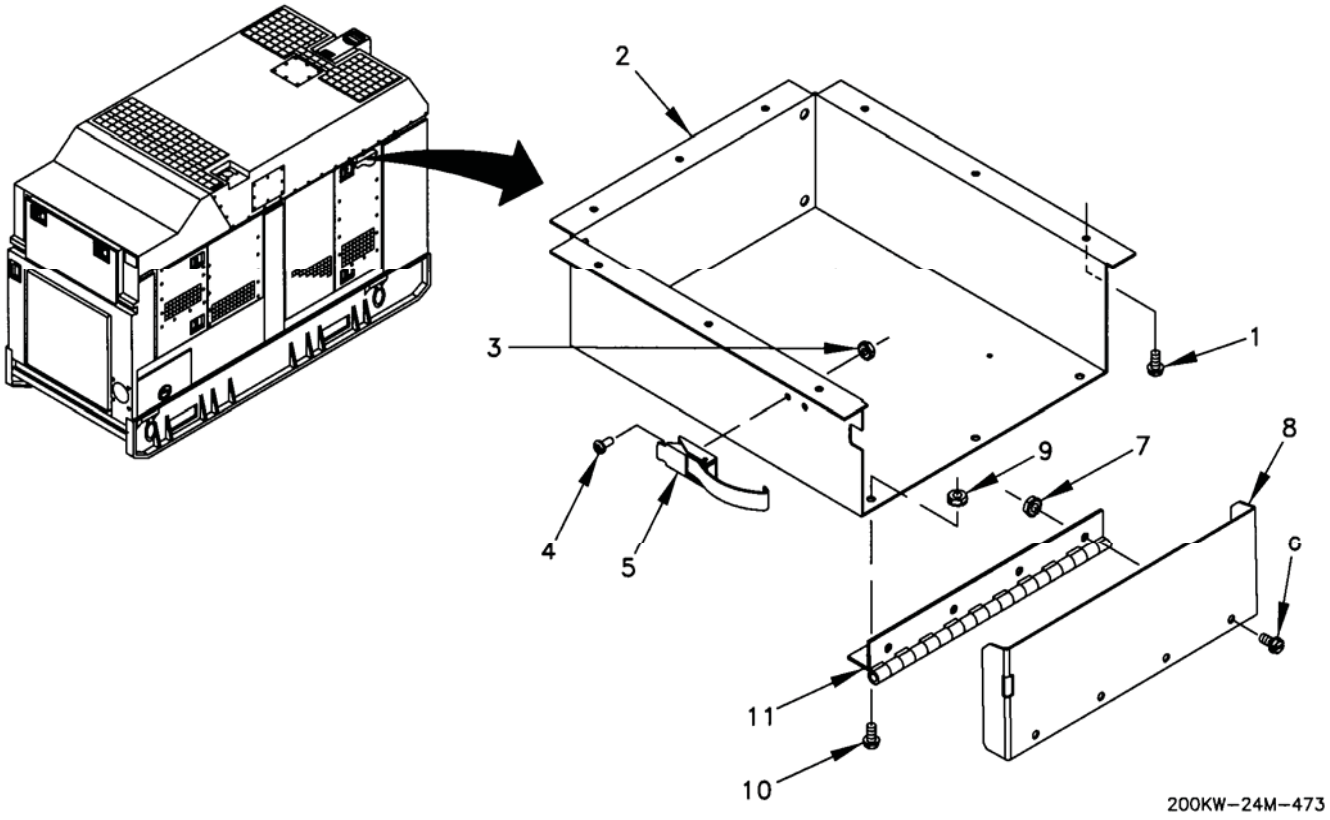

Figure 2. Storage Box Assembly.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

RIGHT REAR DOOR ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools	Personnel Required
Tool Kit, General Mechanic's (WP 0123, Item 1)	One
Materials/Parts	**References**
Foam damping sheet (WP 0124, Item 11)	TM 9-6115-730-24P

WARNINGS

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High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

REMOVAL

1. Turn two latches (Figure 1, Item 1) and open right rear doors (Figure 1, Item 2) and (Figure 1, Item 3).
2. Remove nine lockwashers (Figure 1, Item 4), washers (Figure 1, Item 5), screws (Figure 1, Item 6), and right rear door assembly (Figure 1, Item 3).
3. Remove seal as required.

END OF TASK

DISASSEMBLY

1. Remove eleven screws (Figure 1, Item 10), lockwashers (Figure 1, Item 11), washers (Figure 1, Item 12), and duct (Figure 1, Item 13).
2. Remove nine locknuts (Figure 1, Item 7), screws (Figure 1, Item 8), and hinge (Figure 1, Item 9).

DISASSEMBLY - Continued

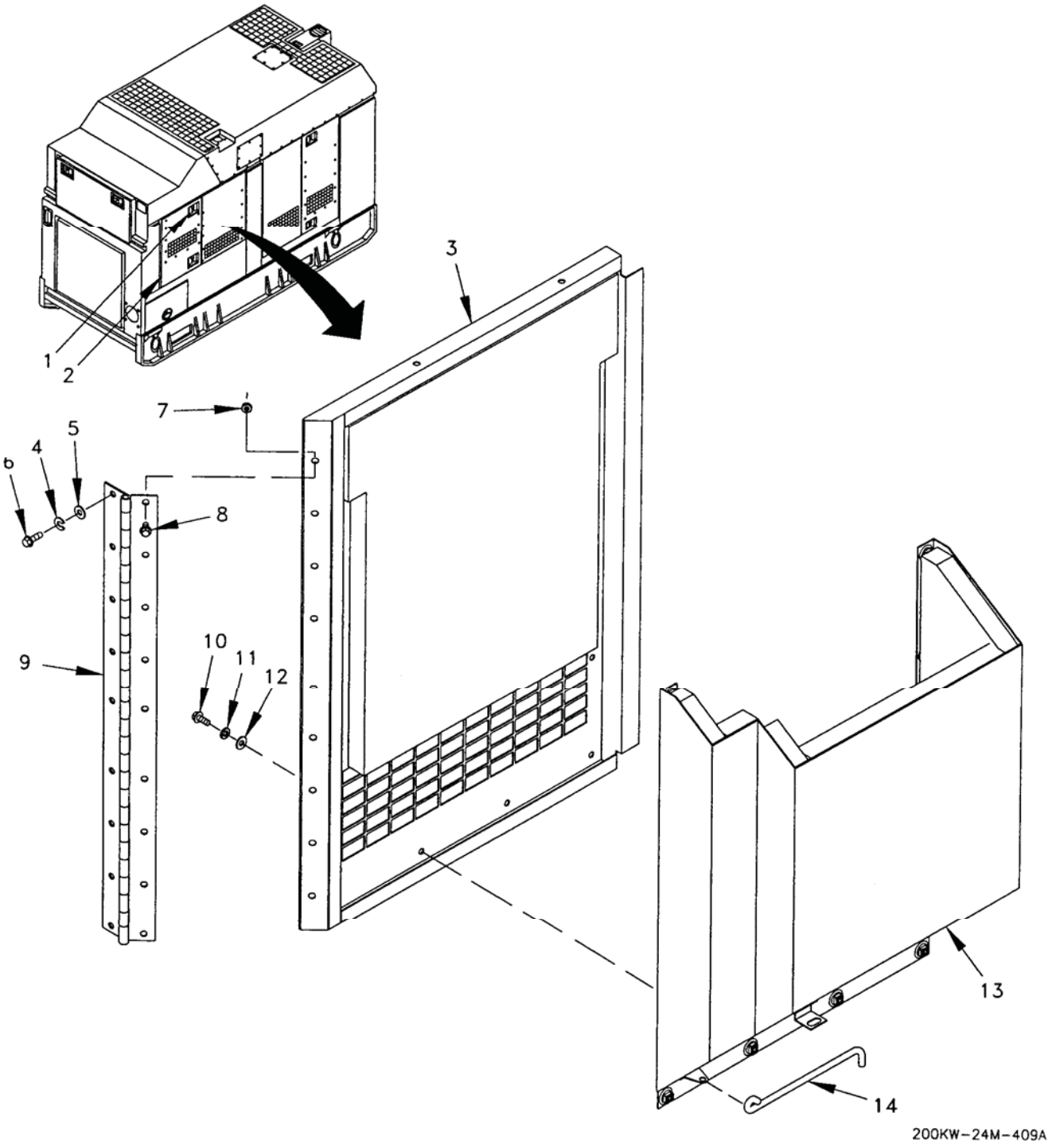

Figure 1. Right Rear Door Assembly.

DISASSEMBLY - Continued

3. Remove door holding rod (Figure 1, Item 14).
4. Remove six foam damping sheets as required.

END OF TASK

ASSEMBLY

1. Install hinge (Figure 1, Item 9) and secure with nine screws (Figure 1, Item 8) and locknuts (Figure 1, Item 7).
2. If necessary, use old foam damping sheets as templates to cut new foam damping sheets.
3. Install six foam damping sheets.
4. Install door holding rod (Figure 1, Item 14).
5. Install duct (Figure 1, Item 13) and secure with eleven washers (Figure 1, Item 12), lockwashers (Figure 1, Item 11), and screws (Figure 1, Item 10).

END OF TASK

INSTALLATION

1. Install seal as required.
2. Install right rear door assembly (Figure 1, Item 3) and secure with nine screws (Figure 1, Item 6), washers (Figure 1, Item 5), and lockwashers (Figure 1, Item 4).
3. Close right rear doors (Figure 1, Item 3) and (Figure 1, Item 2) and secure by rotating two latches (Figure 1, Item 1).

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

RIGHT REAR DOOR ASSEMBLY (LATCH) MAINTENANCE

INITIAL SETUP:

Tools and Special Tools	Personnel Required
Tool Kit, General Mechanic's (WP 0123, Item 1)	One
Materials/Parts	**References**
Foam damping sheet (WP 0124, Item 11)	TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

REMOVAL

1. Turn two latches (Figure 1, Item 1) and open right rear door assembly (latch) (Figure 1, Item 2).
2. Remove nine screws (Figure 1, Item 3), washers (Figure 1, Item 4), lockwashers (Figure 1, Item 5), and right rear door assembly (latch) (Figure 1, Item 2).
3. Remove seal as required.

END OF TASK

DISASSEMBLY

1. Remove twelve screws (Figure 1, Item 9), lockwashers (Figure 1, Item 10), washers (Figure 1, Item 11), and duct (Figure 1, Item 12).
2. Remove four nuts (Figure 1, Item 13), screws (Figure 1, Item 14), door holding bracket (Figure 1, Item 15), door holding rod (Figure 1, Item 16), and holding rod bracket (Figure 1, Item 17).

DISASSEMBLY - Continued

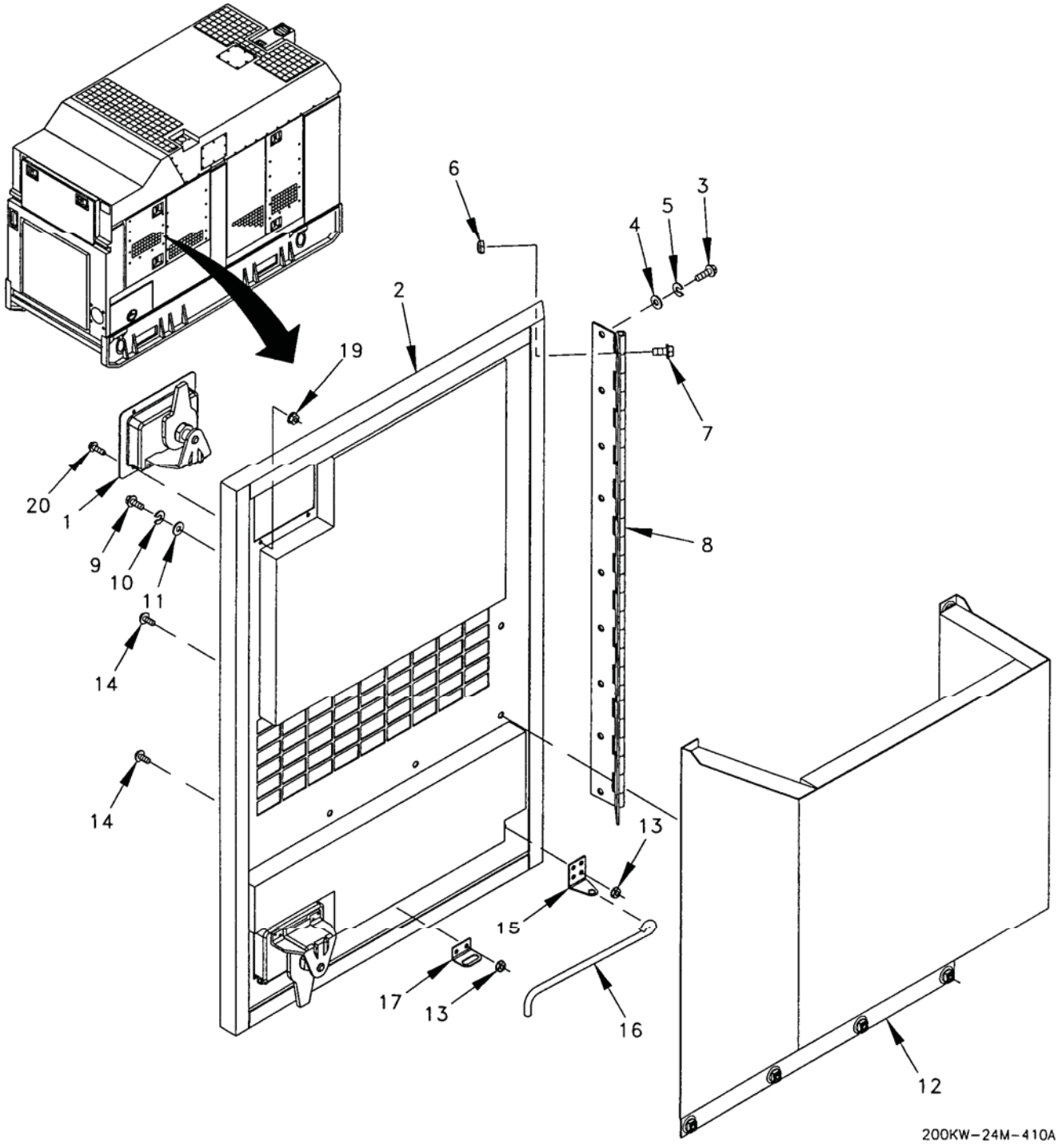

Figure 1. Right Rear Door Assembly (Latch).

DISASSEMBLY - Continued

3. Remove eight nuts (Figure 1, Item 18), screws (Figure 1, Item 19), and two latches (Figure 1, Item 1).
4. Remove five foam damping sheets as required.
5. Remove nine locknuts (Figure 1, Item 6), screws (Figure 1, Item 7), and hinge (Figure 1, Item 8).

END OF TASK

ASSEMBLY

1. Install hinge (Figure 1, Item 8) and secure with nine screws (Figure 1, Item 7) and locknuts (Figure 1, Item 6).
2. If necessary, use old foam damping sheets as templates to cut new foam damping sheets.
3. Install five foam damping sheets.
4. Install two latches (Figure 1, Item 1), and secure with eight screws (Figure 1, Item 19) and nuts (Figure 1, Item 18).
5. Install holding rod bracket (Figure 1, Item 17), door holding rod (Figure 1, Item 16), and door holding bracket (Figure 1, Item 15), and secure with four screws (Figure 1, Item 14) and nuts (Figure 1, Item 13).
6. Install duct (Figure 1, Item 12) and secure with twelve washers (Figure 1, Item 11), lockwashers (Figure 1, Item 10), and screws (Figure 1, Item 9).

END OF TASK

INSTALLATION

1. Install seal as required.
2. Install right rear door assembly (latch) (Figure 1, Item 2) and secure with nine lockwashers (Figure 1, Item 5), washers (Figure 1, Item 4), and screws (Figure 1, Item 3).
3. Close right rear door assembly (latch) (Figure 1, Item 2) and secure by rotating and closing two latches (Figure 1, Item 1).

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
ACCESS COVERS MAINTENANCE

INITIAL SETUP:

Tools and Special Tools	Personnel Required
Tool Kit, General Mechanic's (WP 0123, Item 1)	One
Materials/Parts	**References**
Foam damping sheet (WP 0124, Item 11)	TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

REMOVAL

1. Remove four screws (Figure 1, Item 1), lockwashers (Figure 1, Item 2), washers (Figure 1, Item 3), and right side access cover (Figure 1, Item 4).
2. Remove four screws (Figure 1, Item 5), lockwashers (Figure 1, Item 6), washers (Figure 1, Item 7), and roof mounted access cover (Figure 1, Item 8).

END OF TASK

DISASSEMBLY

Remove foam damping sheet as required.

END OF TASK

ASSEMBLY

If necessary, use old foam damping sheet as template to cut new foam damping sheet. Install foam damping sheet.

END OF TASK

INSTALLATION

1. Install roof mounted access cover (Figure 1, Item 8) and secure with eight washers (Figure 1, Item 7), lockwashers (Figure 1, Item 6), and screws (Figure 1, Item 5).

2. Install right side mounted access cover (Figure 1, Item 4) and secure with eight washers (Figure 1, Item 3), lockwashers (Figure 1, Item 2), and screws (Figure 1, Item 1).

INSTALLATION - Continued

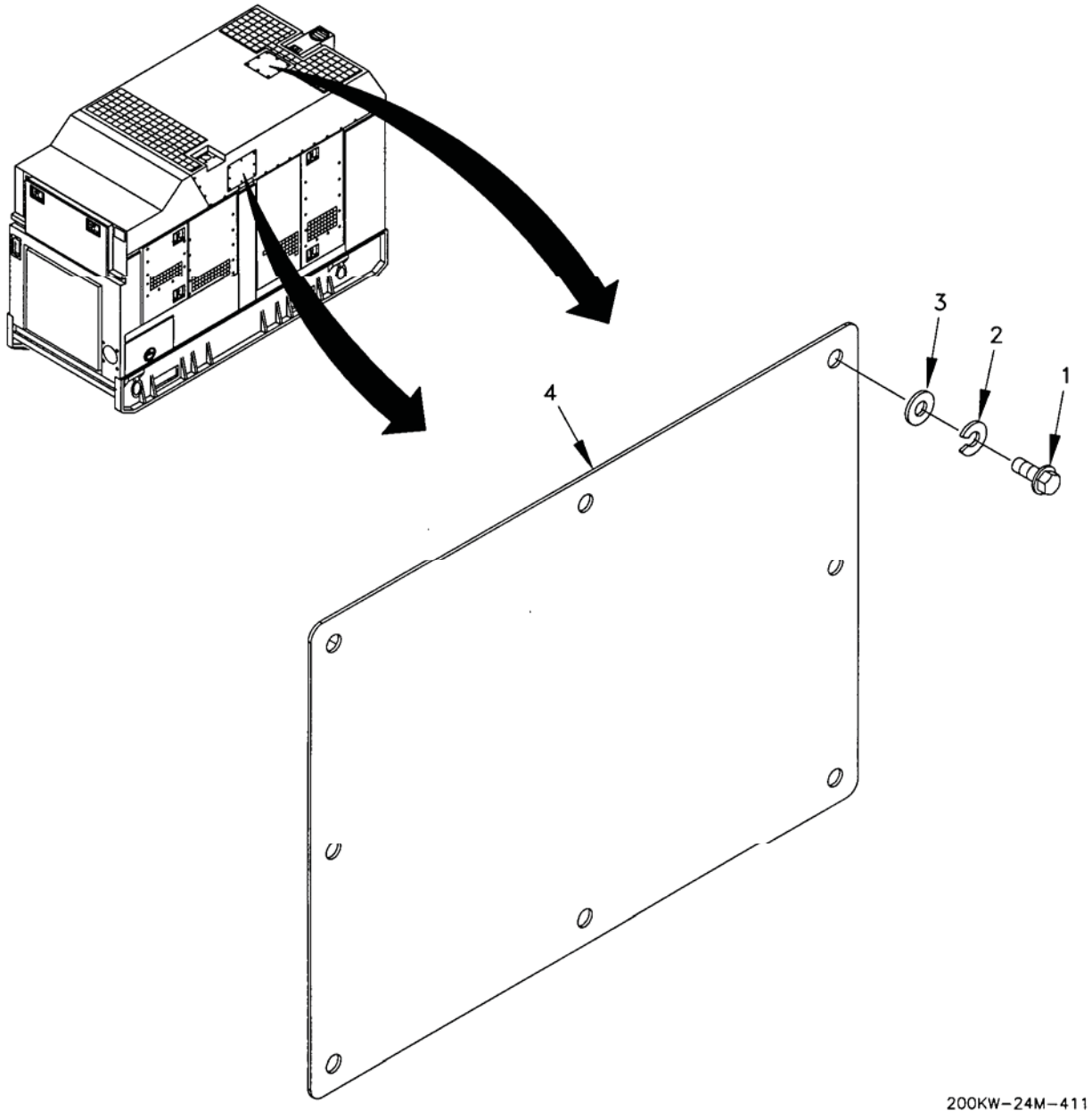

Figure 1. Access Covers.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

FRONT ROOF SECTION HOUSING ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

References

TM 9-6115-730-24P

Materials/Parts

Foam damping sheet (WP 0124, Item 12)
Foam damping sheet (WP 0124, Item 14)
Foam damping sheet (WP 0124, Item 15)

Equipment Condition

Roof mounted access cover removed (WP 0029)

Personnel Required

Two

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

WARNING

Top housing panels can get very hot. Allow panels to cool down before performing maintenance. Failure to comply can result in severe burns to personnel.

WARNING

Front roof section weighs more than 37 pounds (17 kg) and requires a two-person lift. Lifting front roof section can cause back strain. Ensure proper lifting techniques are used when lifting front roof section. Failure to comply can cause injury to personnel.

REMOVAL

1. On EMCP, set ENGINE CONTROL switch to OFF/RESET; set Battery Disconnect Switch to OFF; set DEAD CRANK SWITCH to OFF.

2. Remove 62 screws (Figure 1, Sheet 1, Item 1), washers (Figure 1, Sheet 1, Item 2), and lockwashers (Figure 1, Sheet 1, Item 3).

3 Loosen clamp (Figure 1, Sheet 1, Item 5) connecting coolant filler hose (Figure 1, Item, 6) to bottom of coolant filler neck (Figure 1, Sheet 1, Item 7) and disconnect hose.

4. Remove clamp (Figure 1, Sheet 1, Item 8) from overflow hose (Figure 1, Sheet 1, Item 9) at coolant filler neck (Figure 1, Sheet 1, Item 7) and pull hose back through hole in front roof section (Figure 1, Sheet 1, Item 4).

5. Remove exhaust clamp (Figure 1, Sheet 1, Item 10) by removing two screws (Figure 1, Sheet 1, Item 11) and lockwashers (Figure 1, Sheet 1, Item 12) (access through access hole).

NOTE

Sufficient force is required for removal. Use slide and lift motion to release front roof housing section.

6. Using two persons, slide front roof section housing assembly (Figure 1, Sheet 1, Item 4) toward front of generator set in order to separate exhaust out tube assembly (Figure 1, Sheet 2, Item 21) from muffler. Lift and remove front roof section housing assembly.

END OF TASK

DISASSEMBLY

1. If necessary, remove 119 clips (Figure 1, Sheet 2, Item 13), 75 push-on nuts (Figure 1, Sheet 2, Item 14), and 14 foam damping sheets.

2. Remove eight screws (Figure 1, Sheet 2, Item 15), washers (Figure 1, Sheet 2, Item 16), lockwashers (Figure 1, Sheet 2, Item 17), and exhaust cover (Figure 1, Sheet 2, Item 18).

3. Remove four screws (Figure 1, Sheet 2, Item 19) and washers (Figure 1, Sheet 2, Item 20) and remove exhaust out tube assembly (Figure 1, Sheet 2, Item 21) from front roof section housing (Figure 1, Sheet 2, Item 4).

4. Remove four screws (Figure 1, Sheet 2, Item 22), nuts (Figure 1, Sheet 2, Item 23) and coolant filler neck (Figure 1, Sheet 2, Item 7).

DISASSEMBLY - Continued

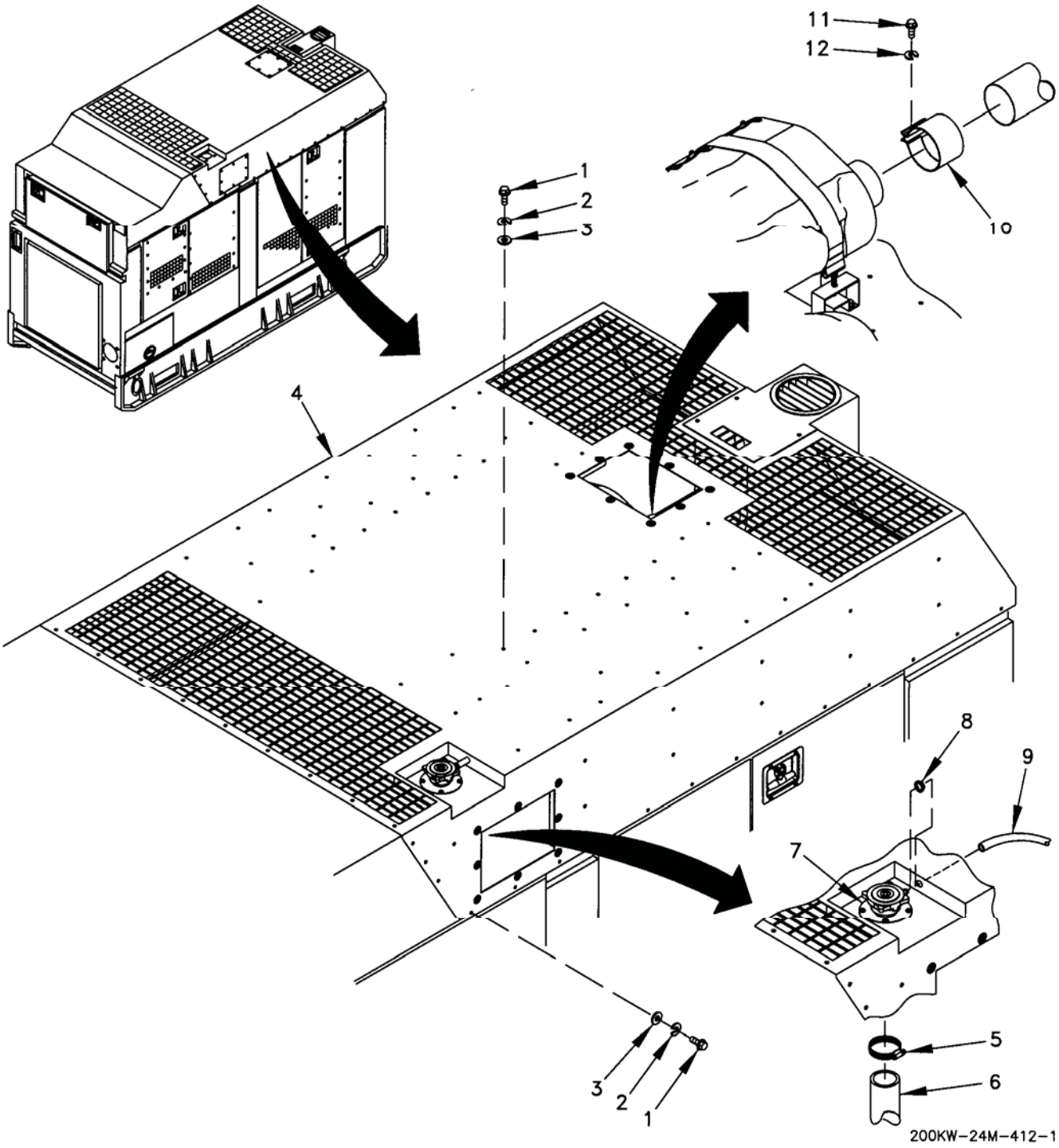

Figure 1. Front Roof Section Housing Assembly (Sheet 1 of 2).

DISASSEMBLY - Continued

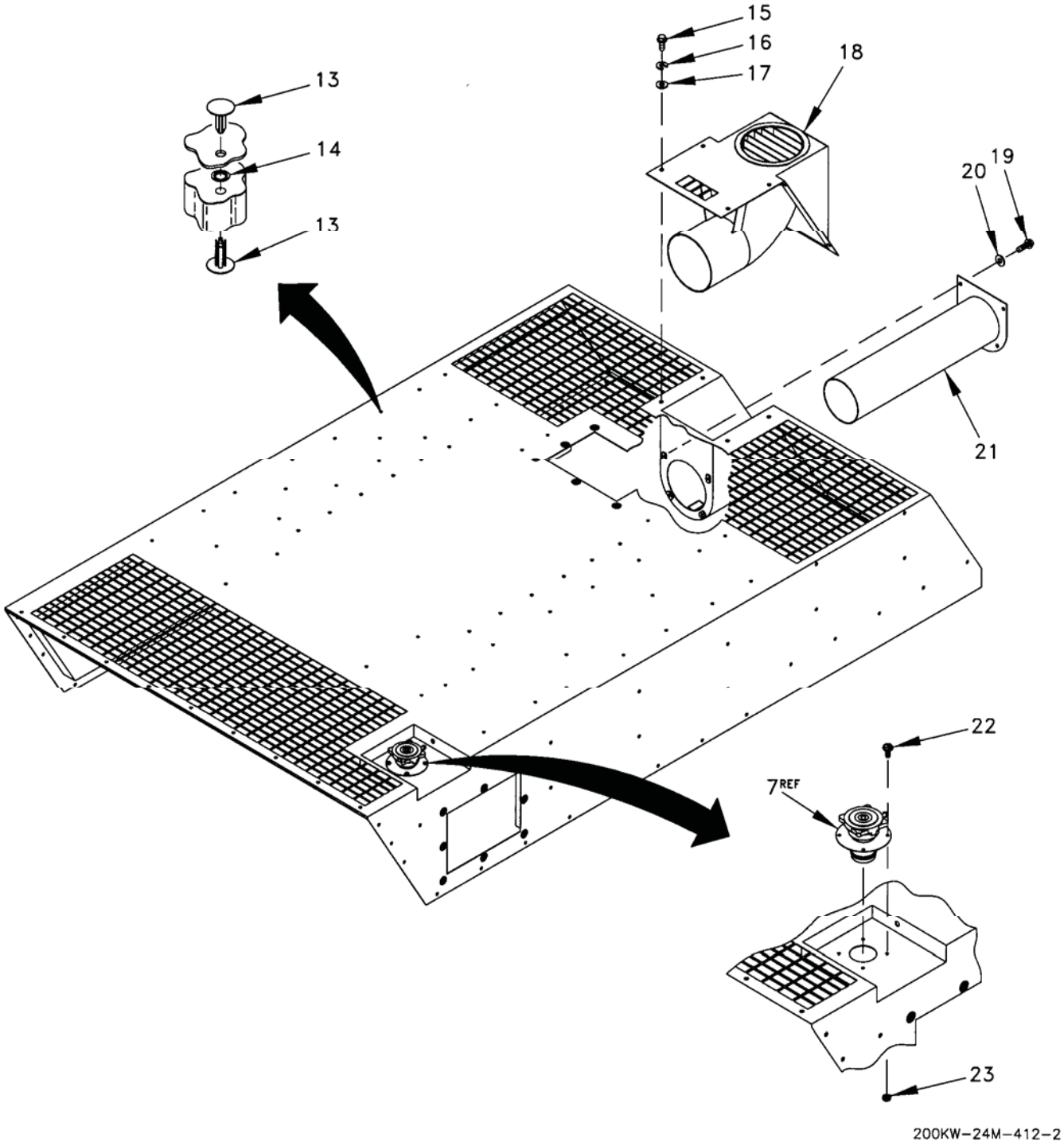

Figure 1. Front Roof Section Housing Assembly (Sheet 2 of 2).

END OF TASK

ASSEMBLY

1. Install four screws (Figure 1, Sheet 2, Item 22), nuts (Figure 2, Sheet 1, Item 23) and coolant filler neck (Figure 1, Sheet 2, Item 7).

2. Install exhaust out tube assembly (Figure 1, Sheet 2, Item 21) into front roof section (Figure 1, Sheet 1, Item 4) with four screws (Figure 1, Sheet 2, Item 19), and lockwashers (Figure 1, Sheet 1, Item 20).

3. Install exhaust cover using eight screws (Figure 1, Sheet 2, Item 15), lockwashers (Figure 1, Sheet 2, Item 16) and washers (Figure 1, Sheet 2, Item 17) into front roof section (Figure 1, Sheet 1, Item 4).

4. If necessary, use old foam damping sheets as templates to cut new foam damping sheets. Install 14 foam damping sheets, 75 push-on nuts (Figure 1, Sheet 2, Item 14), and 119 clips (Figure 1, Sheet 2, Item 13).

END OF TASK

INSTALLATION

1. Using two persons, align exhaust out tube assembly and install front roof section housing assembly (Figure 1, Sheet 1, Item 4).

2. Install exhaust clamp (Figure 1, Sheet 1, Item 10) loosely between muffler and exhaust out tube assembly (Figure 1, Sheet 1, Item 21) while front roof section is loose.

3. Secure front roof section housing assembly (Figure 1, Sheet 1, Item 4) with 62 washers (Figure 1, Sheet 1, Item 3), lockwashers (Figure 1, Sheet 1, Item 2), and screws (Figure 1, Sheet 1, Item 1).

4. Install and tighten two screws (Figure 1, Sheet 1, Item 11) and lockwashers (Figure 1, Sheet 1, Item 12) on exhaust muffler clamp (Figure 1, Sheet 1, Item 10) (access through access hole in cover).

5. Connect hose (Figure 1, Sheet 1, Item 6) to bottom of coolant filler neck (Figure 1, Sheet 1, Item 7) and tighten clamp (Figure 1, Sheet 1, Item 5).

6. Route overflow hose (Figure 1, Sheet 1, Item 9) back through hole in front roof section (Figure 1, Sheet 1, Item 4) and connect hose to coolant filler neck (Figure 1, Sheet 1, Item 7) tighten clamp (Figure 1, Sheet 1, Item 8).

7. Install access covers (WP 0029).

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
REAR ROOF SECTION HOUSING ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

References

TM 9-6115-730-24P

Materials/Parts

Foam damping sheet (WP 0124, Item 12)
Foam damping sheet (WP 0124, Item 14)
Foam damping sheet (WP 0124, Item 15)

Equipment Condition

Roof-mounted access cover removed (WP 0029)
Front roof section removed (WP 0030)

Personnel Required

One

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

REMOVAL

1. Remove 20 screws (Figure 1, Item 1), washers (Figure 1, Item 2), lockwashers (Figure 1, Item 3).
2. Remove nine screws (Figure 1, Item 5), washers (Figure 1, Item 6), and lockwashers (Figure 1, Item 7).
3. Remove nine screws (Figure 1, Item 8), washers (Figure 1, Item 9), and lockwashers (Figure 1, Item 10).
4. Remove rear roof section housing assembly (Figure 1, Item 4).

REMOVAL - Continued

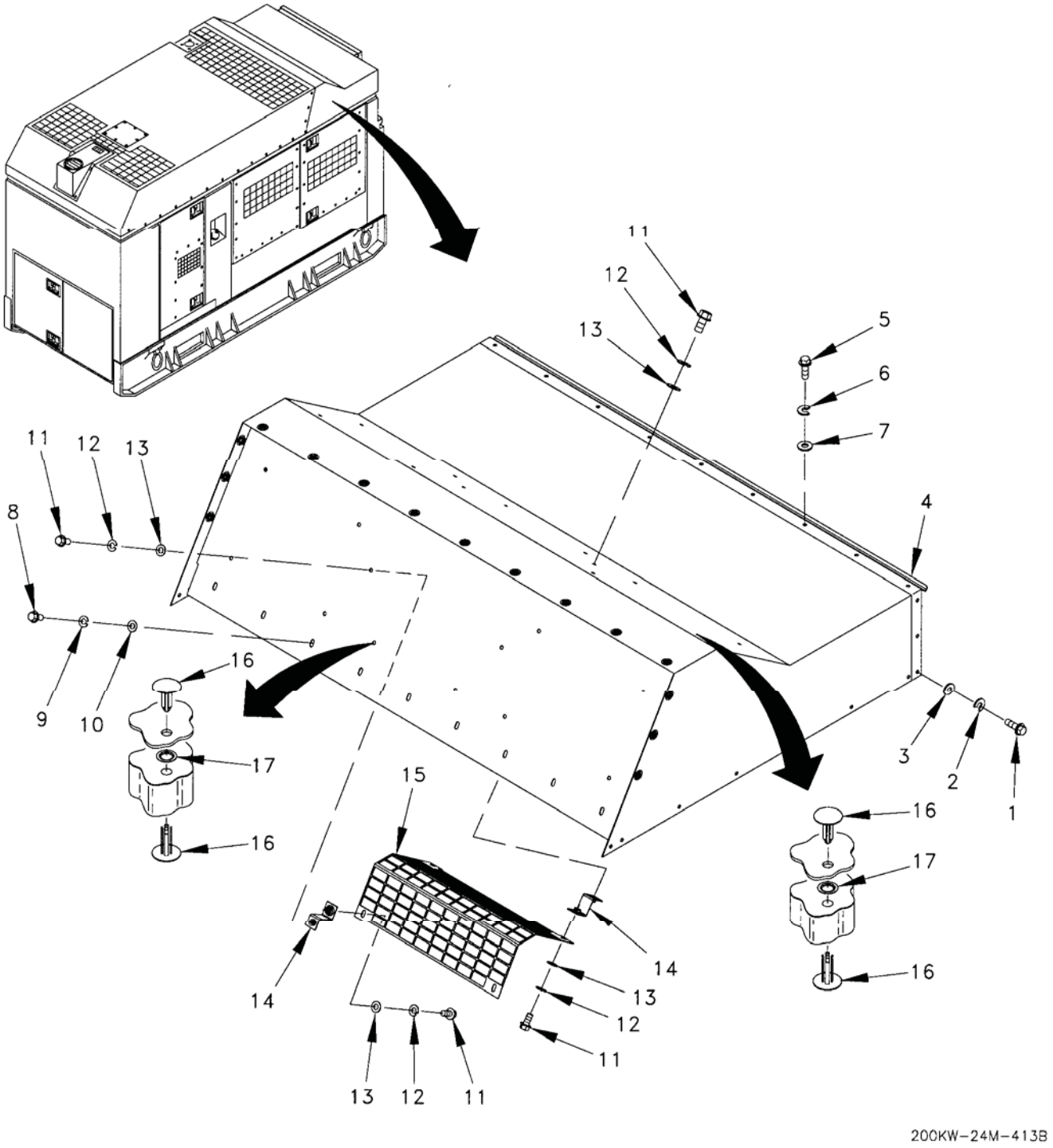

Figure 1. Rear Roof Section Housing Assembly.

END OF TASK

DISASSEMBLY

1. Remove eight screws (Figure 1, Item 11), lockwashers (Figure 1, Item 12), and washers (Figure 1, Item 13) four brackets (Figure 1, Item 14) and grate (Figure 1, Item 15).

2. If necessary, remove 40 clips (Figure 1, Item 16), 20 push-on nuts (Figure 1, Item 17), and remove five foam damping sections as required.

END OF TASK

ASSEMBLY

1. If necessary, use old foam damping sheets as templates to cut new foam damping sheets.

2. Install five foam damping sheets, 20 push-on nuts (Figure 1, Item 17), and 40 clips (Figure 1, Item 16).

3. Install grate (Figure 1, Item 15) and four brackets (Figure 1, Item 14) using eight screws (Figure 1, Item 11), lockwashers (Figure 1, Item 12), and washers (Figure 1, Item 13).

END OF TASK

INSTALLATION

1. Install rear roof section housing assembly (Figure 1, Item 4).

2. Install nine screws (Figure 1, Item 8), lockwashers (Figure 1, Item 9), and washers (Figure 1, Item 10).

3. Install nine screws (Figure 1, Item 5), lockwashers (Figure 1, Item 6), and washers (Figure 1, Item 7).

4. Install 20 screws (Figure 1, Item 1), lockwashers (Figure 1, Item 2), and washers (Figure 1, Item 3).

5. Install front roof section housing assembly (WP 0030).

6. Install roof-mounted access covers (WP 0029).

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

ENGINE GENERATOR COMPARTMENT CEILING ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Materials/Parts

Foam damping sheet (WP 0124, Item 12)

Personnel Required

Two

References

TM 9-6115-730-24P

Equipment Condition

Front roof section housing assembly removed (WP 0030)
Rear roof section housing assembly removed (WP 0031)
Exhaust system removed (WP 0069)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

WARNING

Top housing panels can get very hot. Allow panels to cool down before performing maintenance. Failure to comply can result in severe burns to personnel.

WARNING

The engine generator compartment ceiling weighs more than 37 pounds (17 kg) and requires a two-person lift. Lifting engine generator compartment ceiling can cause back strain. Ensure proper lifting techniques are used when lifting engine generator compartment ceiling. Failure to comply can cause injury to personnel.

REMOVAL

1. Remove nine screws (Figure 1, Item 1), washers (Figure 1, Item 2), and lockwashers (Figure 1, Item 3) from engine compartment ceiling assembly (Figure 1, item 4).

2. Remove 43 screws (Figure 1, Item 5), lockwashers (Figure 1, Item 6), and washers (Figure 1, Item 7) from engine compartment ceiling assembly (Figure 1, Item 4) (21 sets on the right side and 22 sets on the left).

3. Remove two screws (Figure 1, Item 8), lockwashers (Figure 1, Item 9), and washers (Figure 1, Item 10) securing bracket (Figure 1, Item 11) to air cleaner bracket (Figure 1, Item 12).

4. Remove engine generator compartment ceiling assembly (Figure 1, Item 4).

END OF TASK

DISASSEMBLY

1. Remove sixteen nuts (Figure 1, Item 13), screws (Figure 1, Item 14), lockwashers (Figure 1, Item 15), washers (Figure 1, Item 16) and two brackets (Figure 1, Item 17).

2. If necessary, remove 126 clips (Figure 1, Item 18), 63 push-on nuts (Figure 1, Item 19) and remove foam damping section.

END OF TASK

ASSEMBLY

1. If necessary, use old foam damping section as template to cut new foam damping section. Install foam damping section, 63 push-on nuts (Figure 1, Item 19), and 126 clips (Figure 1, Item 18).

2. Install two brackets (Figure 1, Item 17) using16 washers (Figure 1, Item 16), lockwashers (Figure 1, Item 15), screws (Figure 1, Item 14), and nuts (Figure 1, Item 13).

END OF TASK

INSTALLATION

1. Install engine generator compartment ceiling assembly (Figure 1, Item 4).

2. Install bracket (Figure 1, Item 11) onto air cleaner bracket (Figure 1, Item 12) using two washers (Figure 1, Item 10), lockwashers (Figure 1, Item 9), and screws (Figure 1, Item 8).

3. Install engine compartment ceiling assembly (Figure 1, Item 4) using 43 washers (Figure 1, Item 7), lockwashers (Figure 1, Item 6), and screws (Figure 1, Item 5) (21 sets on the right side and 22 sets on the left).

INSTALLATION - Continued

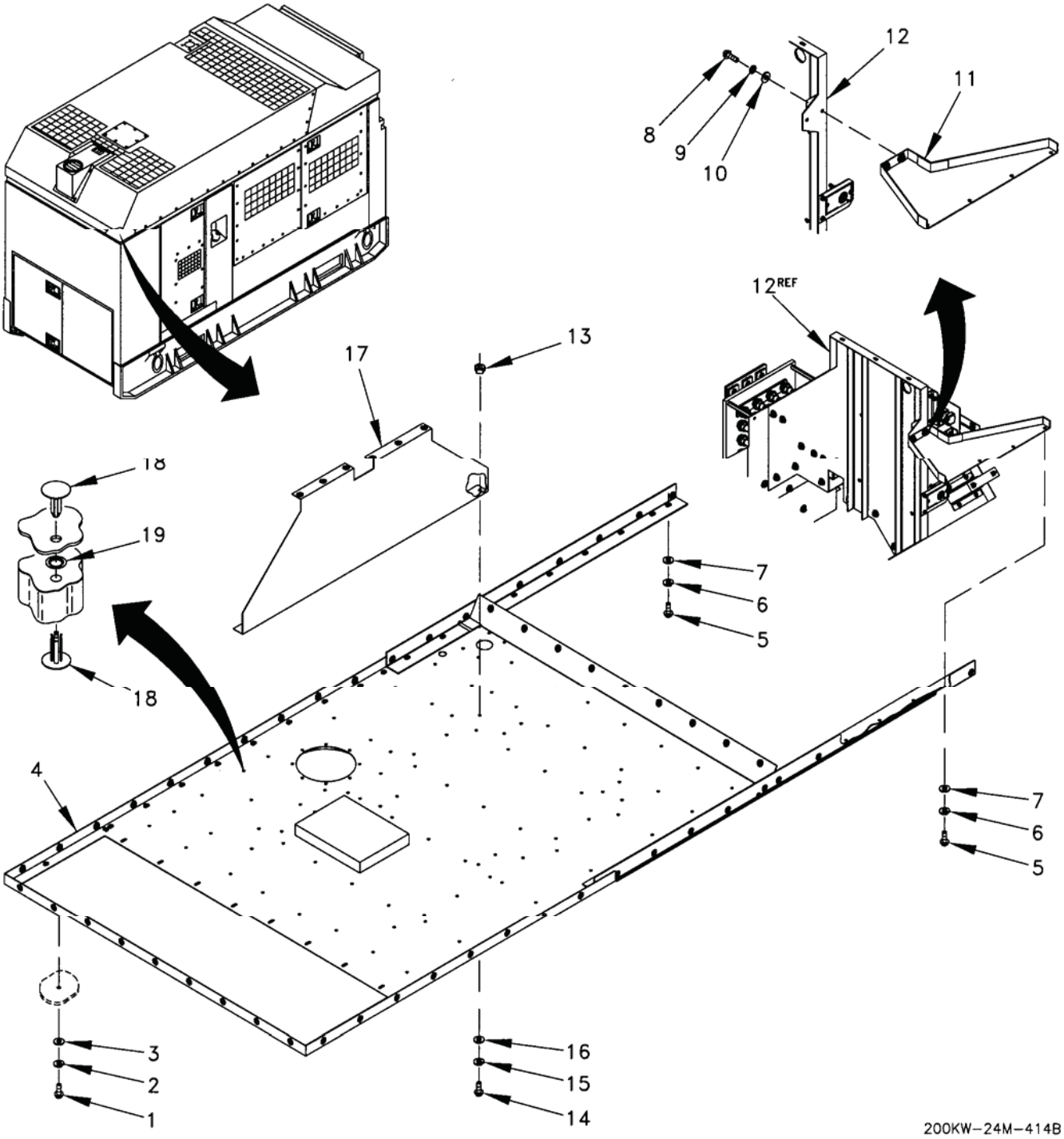

Figure 1. Engine Generator Compartment Ceiling Assembly.

INSTALLATION - Continued

4. Install nine lockwashers (Figure 1, Item 3), washers (Figure 1, Item 2), and screws (Figure 1, Item 1).
5. Install exhaust system (WP 0069).
6. Install rear roof section housing assembly (WP 0031).
7. Install front roof section housing assembly (WP 0030).

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

GENERATOR ACCESS COVER ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools	Personnel Required
Tool Kit, General Mechanic's (WP 0123, Item 1)	One
Materials/Parts	**References**
Foam damping sheet (WP 0124, Item 11)	TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

REMOVAL

Remove 22 screws (Figure 1, Item 1), washers (Figure 1, Item 2), lockwashers (Figure 1, Item 3), and generator access panel assembly (Figure 1, Item 4).

END OF TASK

DISASSEMBLY

Remove foam damping sheet as required.

END OF TASK

ASSEMBLY

1. If necessary, use old foam damping sheet as template to cut new foam damping sheet.

2. Install foam damping sheet.

END OF TASK

INSTALLATION

Install generator access panel assembly (Figure 1, Item 4) and secure with 20 lockwashers (Figure 1, Item 3), washers (Figure 1, Item 2), and screws (Figure 1, Item 1).

INSTALLATION - Continued

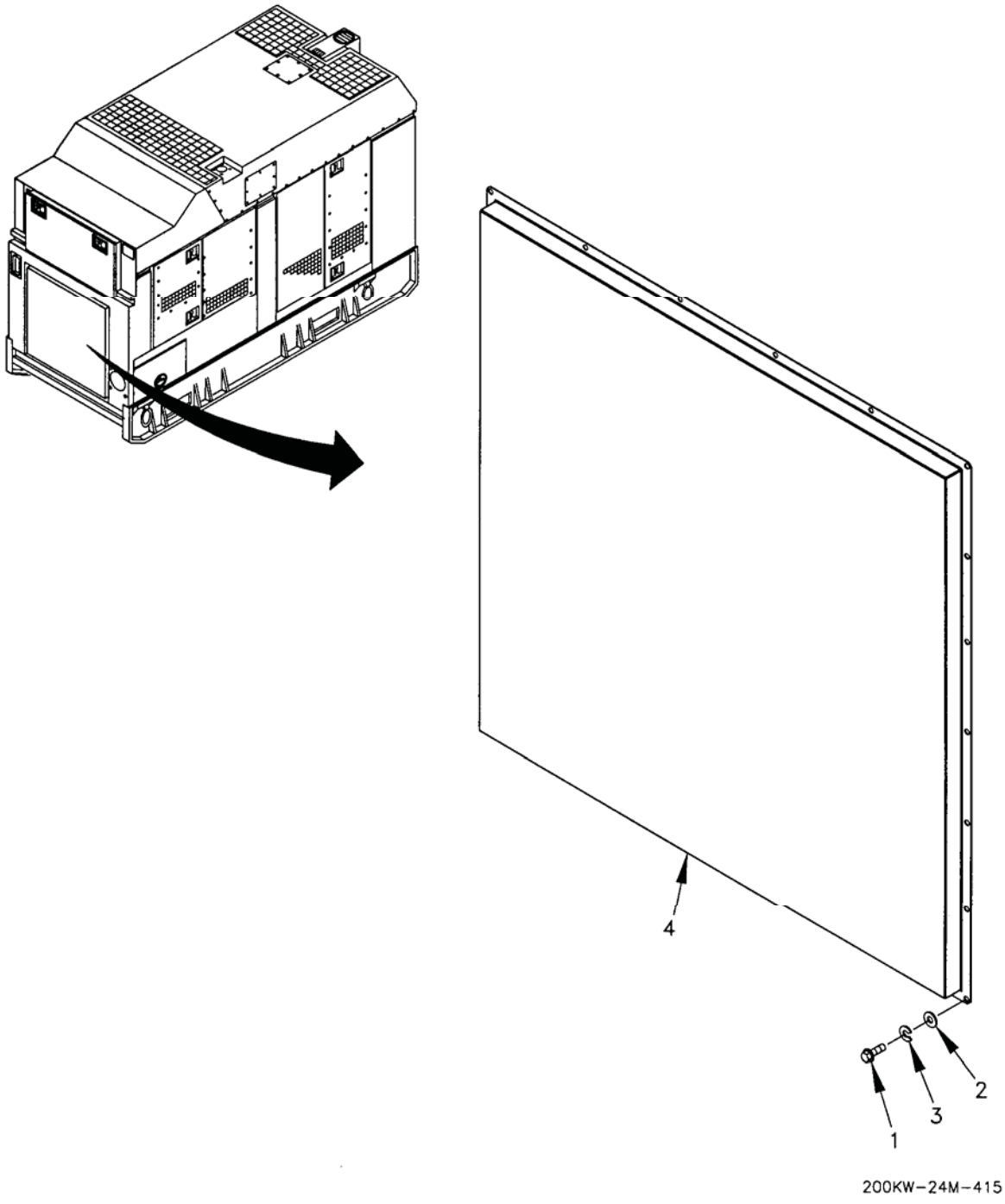

Figure 1. Generator Access Cover Assembly.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

FRONT SECTION HOUSING ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Materials/Parts

Foam damping sheet (WP 0124, Item 11)
Foam damping sheet (WP 0124, Item 12)

Personnel Required

One

References

TM 9-6115-730-24P

Equipment Condition

Right battery access door assembly removed (WP 0018)
Left battery access door assembly removed (WP 0019)
Left front door assembly (latch) removed (WP 0021)
Right front door assembly (latch) removed (WP 0025)
Front roof section housing removed (WP 0030)
Engine generator compartment ceiling removed (WP 0032)
Batteries removed (WP 0050)
Battery disconnect switch removed (WP 0051)
Slave receptacle removed (WP 0054)
Winterization heater assembly removed, if applicable (WP 0090)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

REMOVAL

1. Remove six screws (Figure 1, Sheet 1, Item 1), lockwashers (Figure 1, Sheet 1, Item 2), washers (Figure 1, Sheet 1, Item 3), and nuts (Figure 1, Sheet 1, Item 4).

REMOVAL - Continued

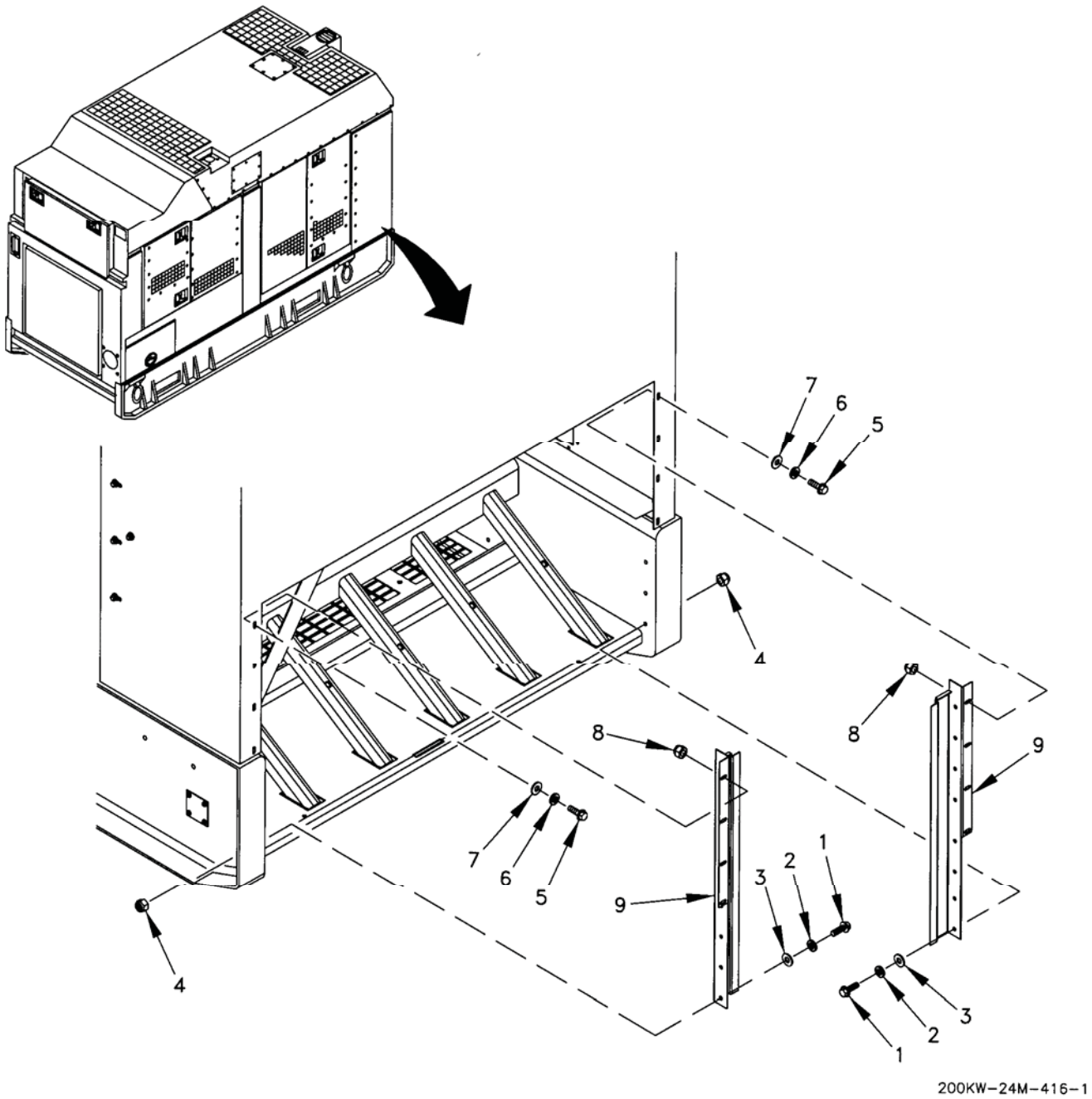

Figure 1. Front Section Housing Assembly (Sheet 1 of 2).

REMOVAL - Continued

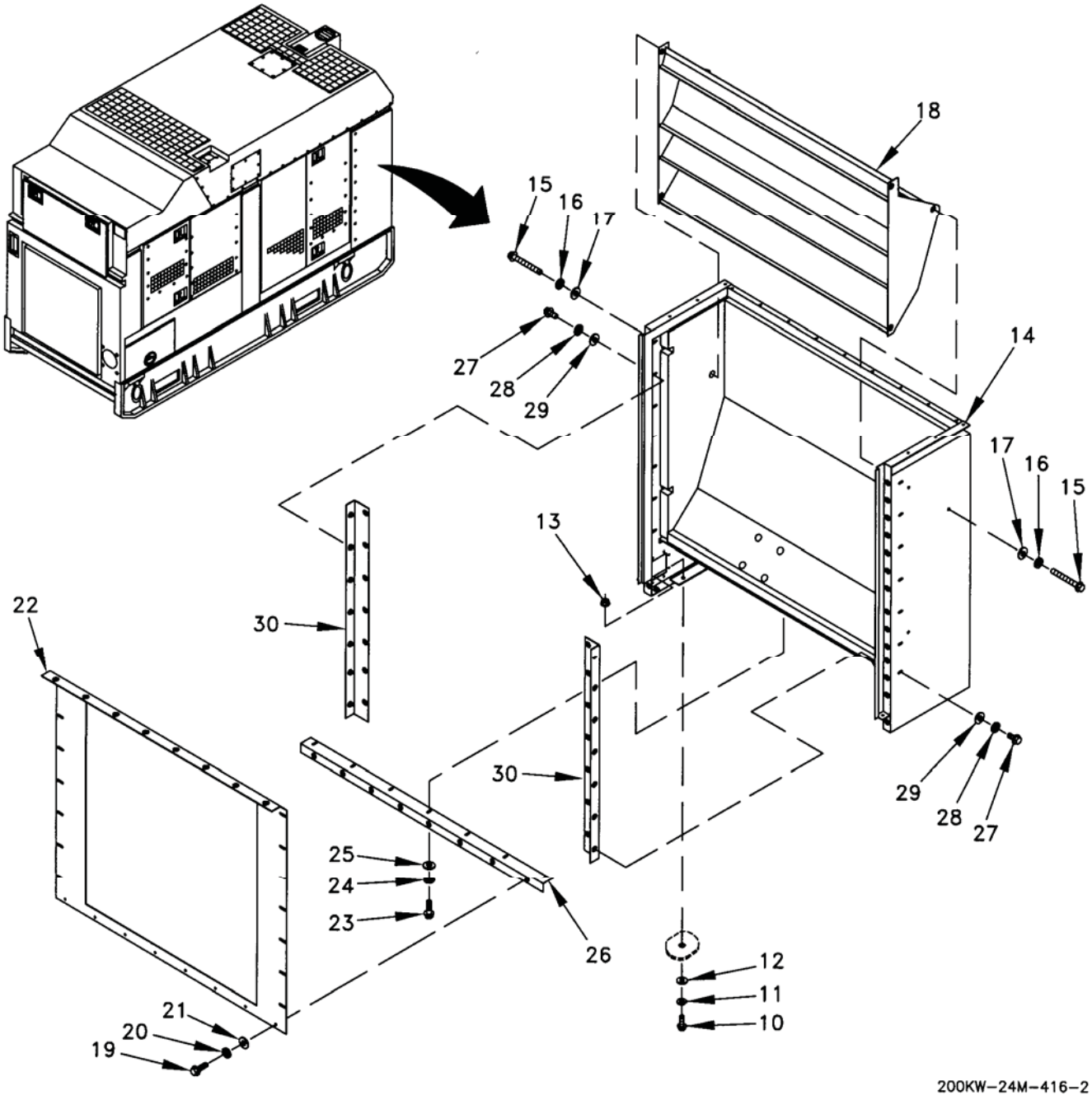

Figure 1. Front Section Housing Assembly (Sheet 2 of 2).

2. Remove six screws (Figure 1, Sheet 2, Item 10), lockwashers (Figure 1, Sheet 2, Item 11), washers (Figure 1, Sheet 2, Item 12), nuts (Figure 1, Sheet 2, Item 13) and front section housing assembly (Figure 1, Sheet 2, Item 14).

END OF TASK

NOTE

DISASSEMBLY should not be done until front section housing assembly has been removed.

DISASSEMBLY

1. Remove six screws (Figure 1, Sheet 2, Item 15), lockwashers (Figure 1, Sheet 2, Item 16), washers (Figure 1, Sheet 2, Item 17), and vane assembly (Figure 1, Sheet 2, Item 18).

2. Remove fourteen screws (Figure 1, Sheet 2, Item 19), lockwashers (Figure 1, Sheet 2, Item 20), washers (Figure 1, Sheet 2, Item 21), and plate assembly (Figure 1, Sheet 2, Item 22).

3. Remove seven screws (Figure 1, Sheet 2, Item 23), lockwashers (Figure 1, Sheet 2, Item 24), washers (Figure 1, Sheet 2, Item 25), and bracket (Figure 1, Sheet 2, Item 26).

4. Remove fourteen screws (Figure 1, Sheet 2, Item 27), lockwashers (Figure 1, Sheet 2, Item 28), washers (Figure 1, Sheet 2, Item 29), and two brackets (Figure 1, Sheet 2, Item 30).

5. Remove 8 screws (Figure 1, Sheet 1, Item 5), lockwashers (Figure 1, Sheet 1, Item 6), washers (Figure 1, Sheet 1, Item 7), nuts (Figure 1, Sheet 1, Item 8) and door flanges (Figure 1, Sheet 1, Item 9).

6. Remove three foam damping sheets as required.

END OF TASK

ASSEMBLY

1. If necessary, use old foam damping sheets as templates to cut new foam damping sheets.

2. Install door flanges (Figure 1, Sheet 1, Item 9) and secure with 8 screws (Figure 1, Sheet 1, Item 5), lockwashers (Figure 1, Sheet 1, Item 6), washers (Figure 1, Sheet 1, Item 7), and nuts (Figure 1, Sheet 1, Item 8).

3. Install three foam damping sheets.

4. Install two brackets (Figure 1, Sheet 2, Item 30), fourteen washers (Figure 1, Sheet 2, Item 29), lockwashers (Figure 1, Sheet 2, Item 28), and screws (Figure 1, Sheet 2, Item 27).

5. Install bracket (Figure 1, Sheet 2, Item 26), seven washers (Figure 1, Sheet 2, Item 25), lockwashers (Figure 1, Sheet 2, Item 24), and screws (Figure 1, Sheet 2, Item 23).

6. Install plate assembly (Figure 1, Sheet 2, Item 22) and secure with fourteen washers (Figure 1, Sheet 2, Item 21), lockwashers (Figure 1, Sheet 2, Item 20), and screws (Figure 1, Sheet 2, Item 19).

7. Install vane assembly (Figure 1, Sheet 2, Item 18) and secure with six washers (Figure 1, Sheet 2, Item 17), lockwashers (Figure 1, Sheet 2, Item 16), and screws (Figure 1, Sheet 2, Item 15).

END OF TASK

INSTALLATION

1. Install front section housing assembly (Figure 1, Sheet 2, Item 14) and secure with six screws (Figure 1, Sheet 2, Item 10), lockwashers (Figure 1,Sheet 2, Item 11), washers (Figure 1, Sheet 2, Item 12), , and locknuts (Figure 1, Sheet 2, Item 13).
2. Install six screws (Figure 1, Sheet 1, Item 1), lockwashers (Figure 1, Sheet 1, Item 2), washers (Figure 1, Sheet 1, Item 3), and nuts (Figure 1, Sheet 1, Item 4).
3. Install engine generator compartment ceiling (WP 0032).
4. Install front roof section housing (WP 0030).
5. Install battery disconnect switch (WP 0051).
6. Install slave receptacle (WP 0054).
7. Install batteries (WP 0050).
8. Install right front door assembly (latch) (WP 0025).
9. Install left front door assembly (latch) (WP 0021).
10. Install left battery access door assembly (WP 0019).
11. Install right battery access door assembly (WP 0018).

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
REAR SECTION HOUSING ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Materials/Parts

Foam damping sheet (WP 0124, Item 11)

Personnel Required

One

References

TM 9-6115-730-24P

Equipment Condition

Control box assembly removed (WP 0042)
Generator access cover assembly removed (WP 0033)
Left rear door assembly (latch) removed (WP 0023)
Right rear door assembly (latch) removed (WP 0028)
Winterization heater control box assembly removed, if applicable (WP 0089)
Rear roof section housing assembly removed (WP 0031)
Potential transformers PT2 and PT3 removed (WP 0052)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

REMOVAL

1. Remove three screws (Figure 1, Item 1), lockwashers (Figure 1, Item 2), and washers (Figure 1, Item 3).
2. Remove two screws (Figure 1, Item 4), lockwashers (Figure 1, Item 5), and washers (Figure 1, Item 6).
3. Remove six screws (Figure 1, Item 7), lockwashers (Figure 1, Item 8), and washers (Figure 1, Item 9).

REMOVAL - Continued

4. Remove four screws (Figure 1, Item 10), lockwashers (Figure 1, Item 11), and washers (Figure 1, Item 12) and rear section housing assembly (Figure 1, Item 21).

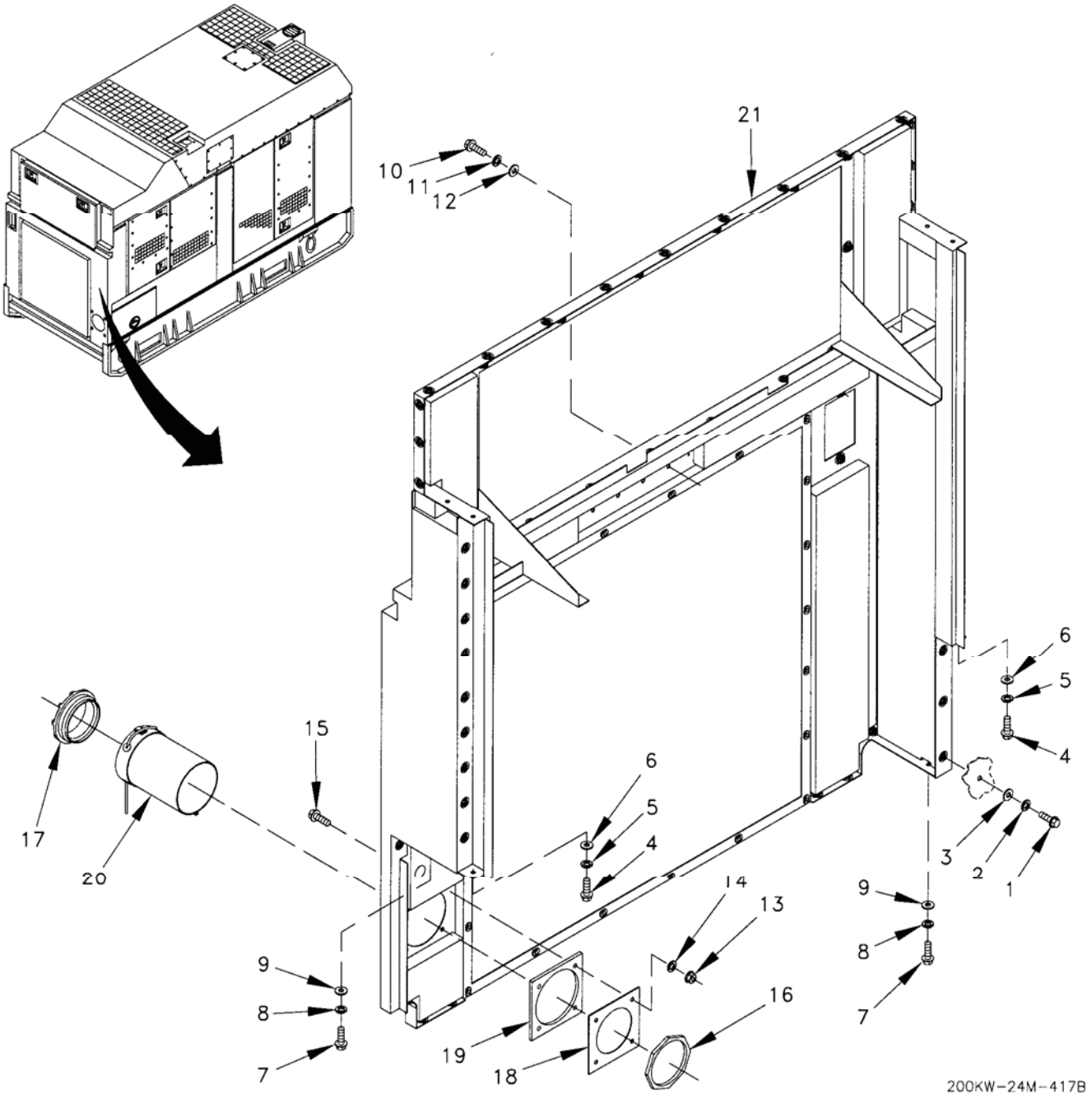

Figure 1. Rear Section Housing Assembly.

END OF TASK

DISASSEMBLY

1. Remove four nuts (Figure 1, Item 13), washers (Figure 1, Item 14), screws (Figure 1, Item 15), locking ring (Figure 1, Item 16), bushing (Figure 1, Item 17), retainer plate (Figure 1, Item 18), spacer (Figure 1, Item 19), and sleeve (Figure 1, Item 20).

2. Remove eight foam damping sheets as required.

END OF TASK

ASSEMBLY

1. If necessary, use old foam damping sheets as templates to cut new foam damping sheets. Install eight foam damping sheets.

2. Install sleeve (Figure 1, Item 20), spacer (Figure 1, Item 19), retainer plate (Figure 1, Item 18), bushing (Figure 1, Item 17), locking ring (Figure 1, Item 16), four screws (Figure 1, Item 15), washers (Figure 1, Item 14), and nuts (Figure 1, Item 13).

END OF TASK

INSTALLATION

1. Install rear section housing assembly (Figure 1, Item 21) and secure with the following

    a. Four screws (Figure 1, Item 10), lockwashers (Figure 1, Item 11), and washers (Figure 1, Item 12).

    b. Six screws (Figure 1, Item 1), lockwashers (Figure 1, Item 2), and washers (Figure 1, Item 3).

    c. Two screws (Figure 1, Item 4), lockwashers (Figure 1, Item 5), and washers (Figure 1, Item 6).

    d. Three screws (Figure 1, Item 7), lockwashers (Figure 1, Item 8), and washers (Figure 1, Item 9).

2. If removed, install winterization kit control box assembly (WP 0089).

3. Install generator access cover assembly (WP 0033).

4. Install control box assembly (WP 0041).

5. Install right rear door assembly (latch) (WP 0028).

6. Install left rear door assembly (latch) (WP 0023).

7. Install control box door panel assembly (WP 0020).

8. Install rear roof section housing assembly (WP 0031).

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
LEFT CENTER PANEL ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Materials/Parts

Foam damping sheet (WP 0124, Item 11)

Personnel Required

One

References

TM 9-6115-730-24P

Equipment Condition

Left rear door assembly removed (WP 0022)
Fuel filler neck pocket disconnected from left center panel assembly (WP 0057)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

REMOVAL

Remove three lockwashers (Figure 1, Item 2), washers (Figure 1, Item 3), screws (Figure 1, Item 4), and left center panel assembly (Figure 1, Item 1).

END OF TASK

DISASSEMBLY

Remove foam damping sheet, if required.

DISASSEMBLY - Continued

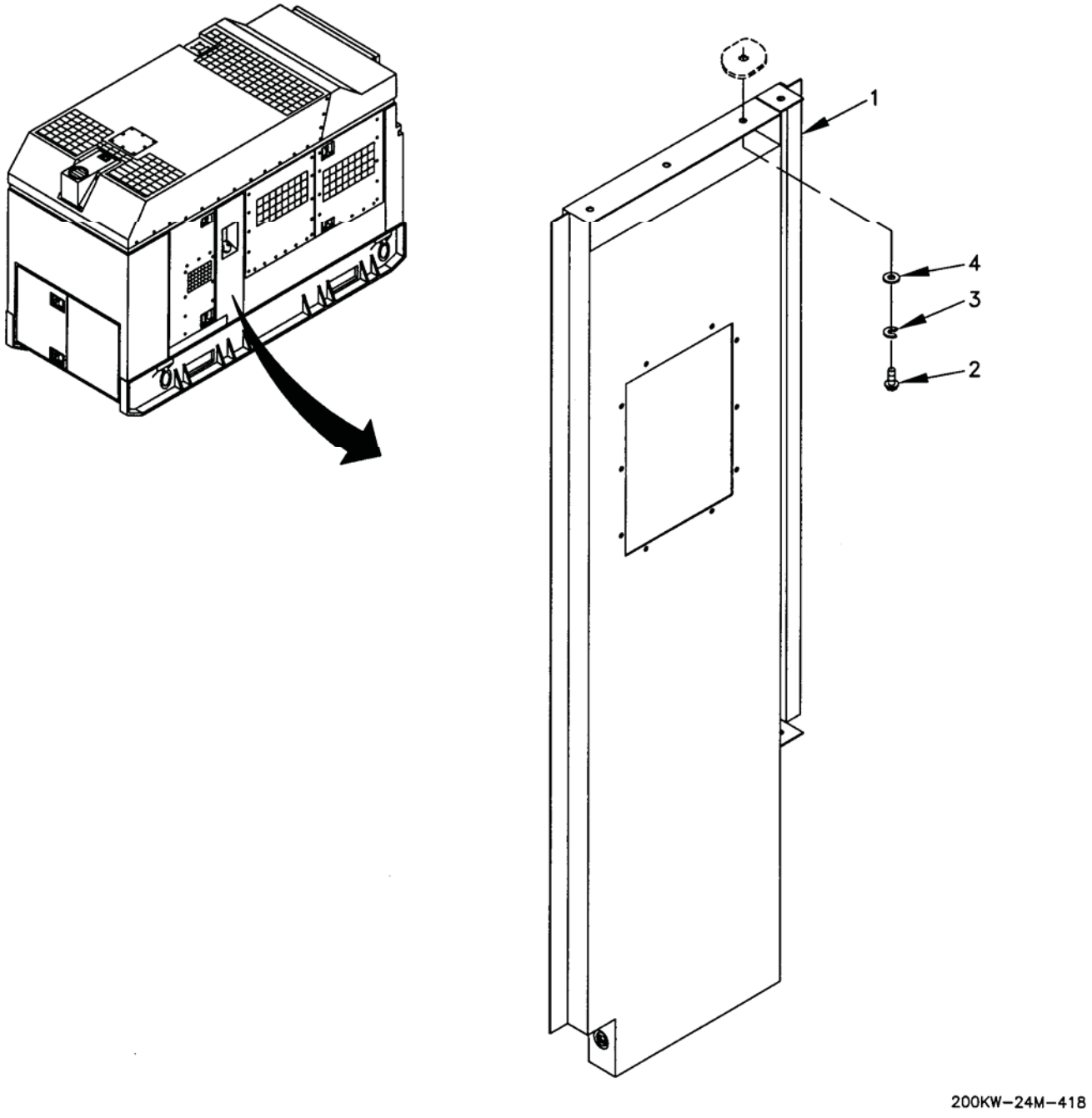

Figure 1. Left Center Panel Assembly.

END OF TASK

ASSEMBLY

If necessary, use old foam damping sheet as template to cut new foam damping sheet. Install foam damping sheet.

END OF TASK

INSTALLATION

1. Install left center panel assembly (Figure 1, Item 1) and secure with three screws (Figure 1, Item 4), washers (Figure 1, Item 3), and lockwashers (Figure 1, Item 2).

2. Connect fuel filler neck pocket to left center panel assembly (Figure 1, Item 1) (WP 0057).

3. Install left rear door assembly (WP 0022).

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

RIGHT CENTER PANEL ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Materials/Parts

Foam damping sheet (WP 0124, Item 11)

Personnel Required

One

References

TM 9-6115-730-24P

Equipment Condition

Right rear door assembly removed (WP 0027)
Right front door assembly removed (WP 0026)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

REMOVAL

Remove seven screws (Figure 1, Item 1), screws (Figure 1, Item 2), washers (Figure 1, Item 3), lockwashers (Figure 1, Item 4), and right center panel assembly (Figure 1, Item 5).

END OF TASK

DISASSEMBLY

Remove foam damping sheet, if required.

DISASSEMBLY - Continued

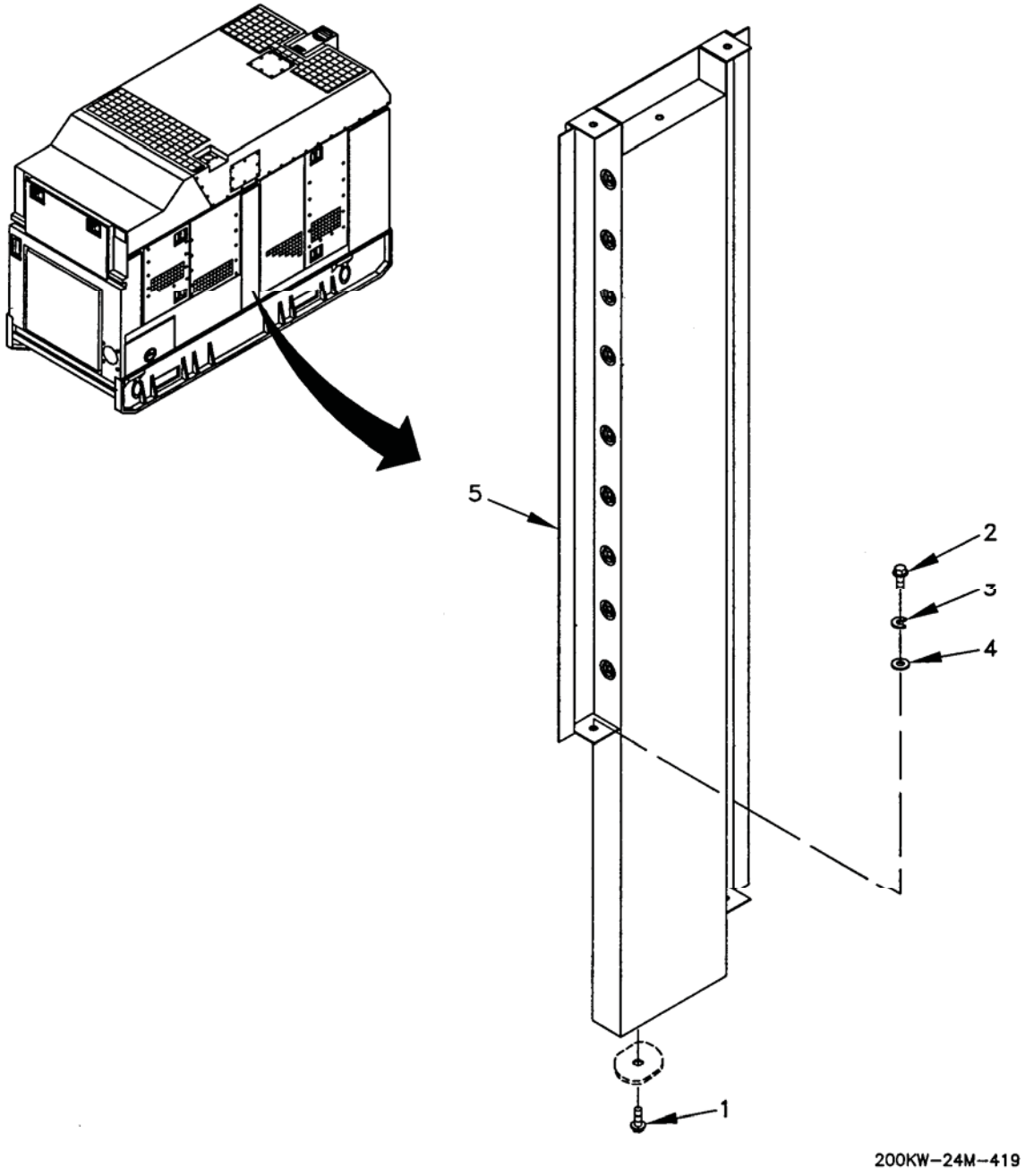

Figure 1. Right Center Panel Assembly.

END OF TASK

ASSEMBLY

If necessary, use old foam damping sheet as template to cut new foam damping sheet. Install new foam damping sheet.

END OF TASK

INSTALLATION

1. Install right center panel assembly (Figure 1, Item 5) and secure with seven lockwashers (Figure 1, Item 4), washers (Figure 1, Item 3), screws (Figure 1, Item 2), and screws (Figure 1, Item 1).

2. Install right front door assembly (WP 0026).

3. Install right rear door assembly (WP 0027).

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

RIGHT REAR PANEL ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools	Personnel Required
Tool Kit, General Mechanic's (WP 0123, Item 1)	One
Materials/Parts	**References**
Foam damping sheet (WP 0124, Item 11)	TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

REMOVAL

Remove eight locknuts (Figure 1, Item 1), washers (Figure 1, Item 2), lockwashers (Figure 1, Item 3), screws (Figure 1, Item 4), and right rear panel assembly (Figure 1, Item 5).

END OF TASK

DISASSEMBLY

Remove two foam damping sheets as required.

END OF TASK

ASSEMBLY

If necessary, use old foam damping sheets as templates to cut new foam damping sheets. Install two foam damping sheets.

END OF TASK

INSTALLATION

Install right rear panel assembly (Figure 1, Item 5) and secure with eight screws (Figure 1, Item 4), lockwashers (Figure 1, Item 3), washers (Figure 1, Item 2), and locknuts (Figure 1, Item 1).

INSTALLATION - Continued

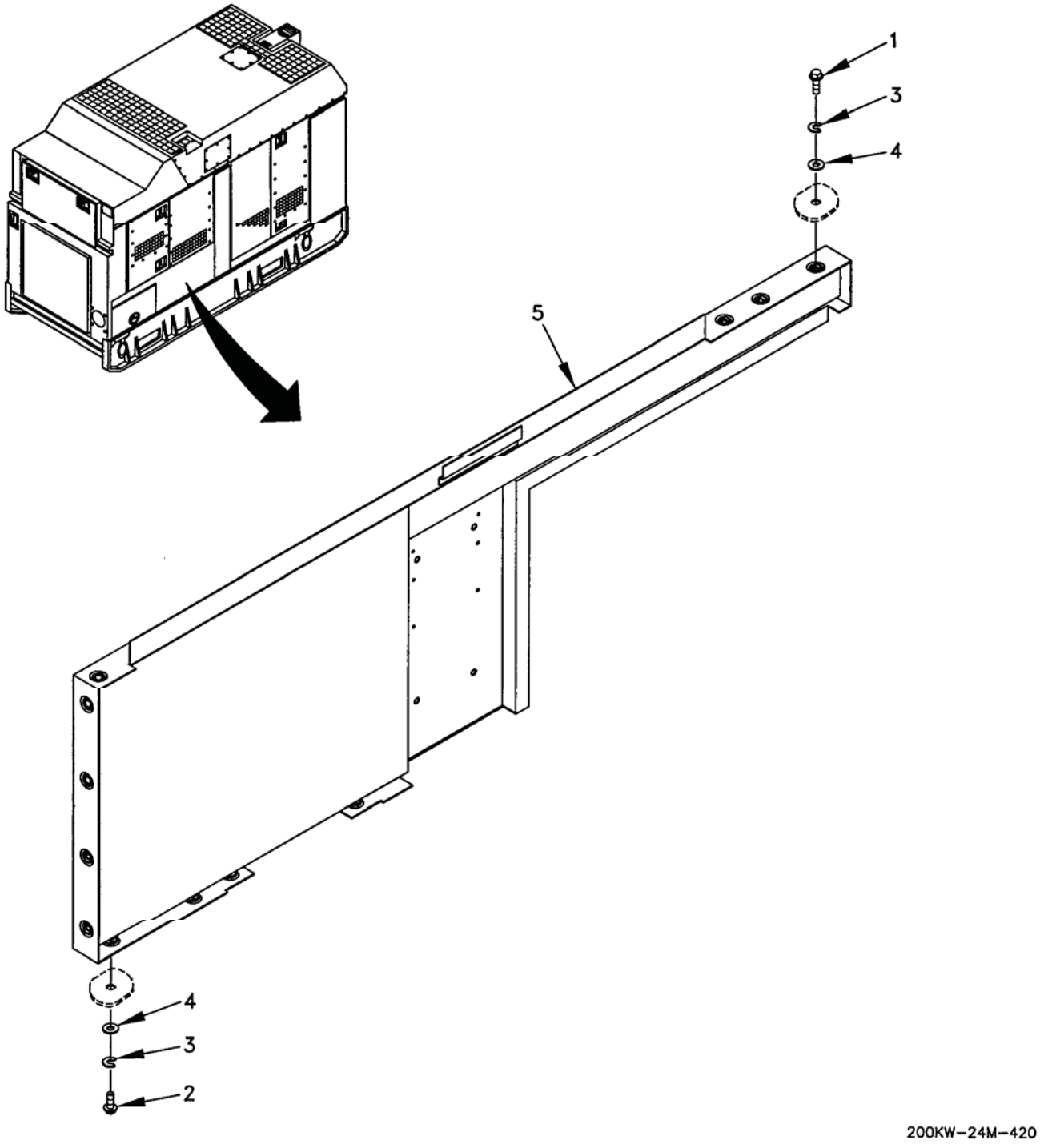

Figure 1. Right Rear Panel Assembly.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

LEFT REAR PANEL ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Personnel Required

One

Materials/Parts

Foam damping sheet (WP 0124, Item 11)

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

REMOVAL

Remove seven screws (Figure 1, Item 1), six screws (Figure 1, Item 2), 13 washers (Figure 1, Item 3), 13 lockwashers (Figure 1, Item 4), and left rear panel assembly (Figure 1, Item 5).

END OF TASK

DISASSEMBLY

Remove three foam damping sheets as required.

END OF TASK

ASSEMBLY

If necessary, use old foam damping sheets as templates to cut new foam damping sheets. Install foam damping sheets.

END OF TASK

INSTALLATION

Install left rear panel assembly (Figure 1, Item 5), and secure with 13 washers (Figure 1, Item 4), 13 lockwashers (Figure 1, Item 3), six screws (Figure 1, Item 2), and seven screws (Figure 1, Item 1).

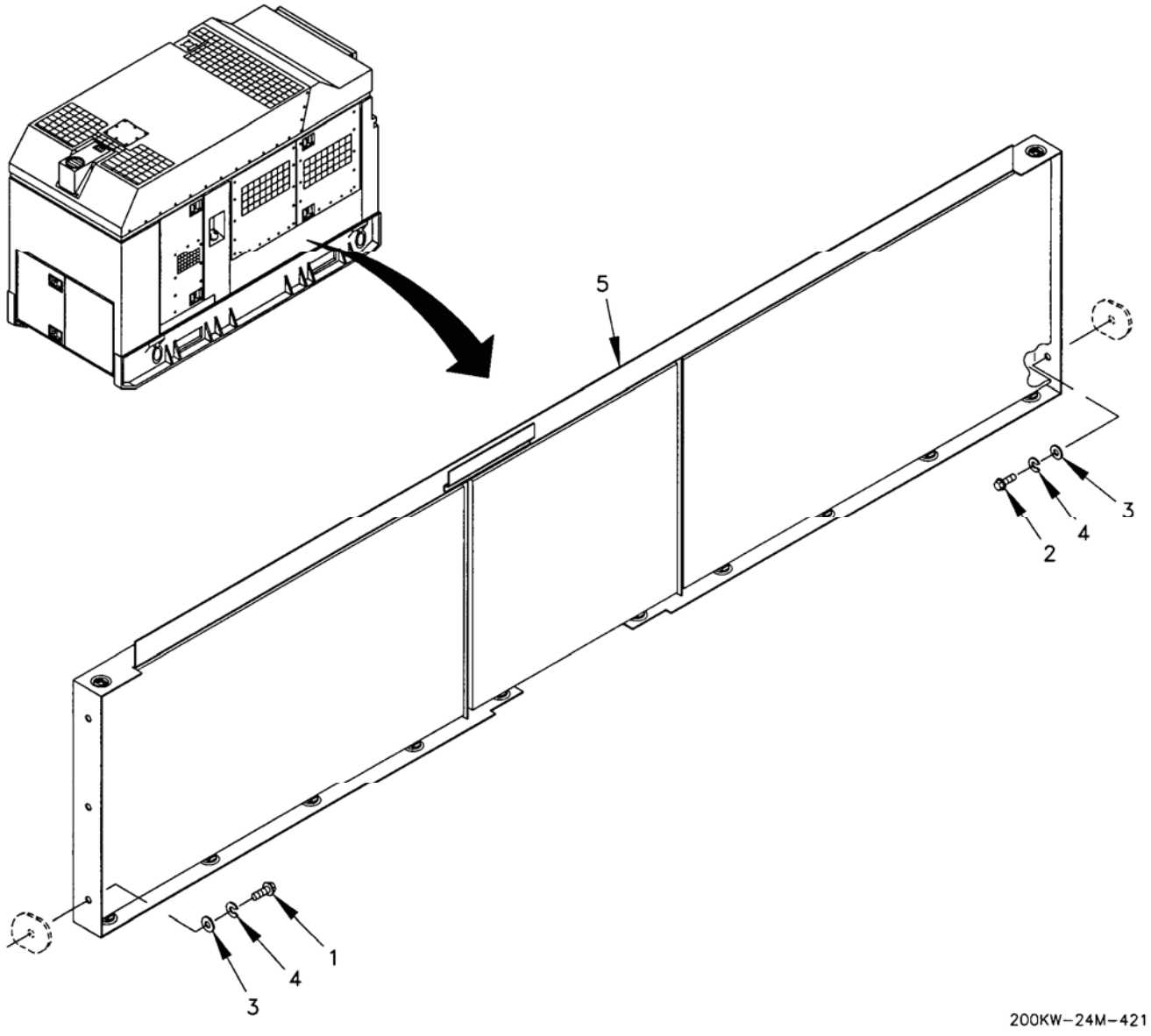

Figure 1. Left Rear Panel Assembly.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

DOOR SUPPORT ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Personnel Required

One

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

REMOVAL

1. Open load board door (Figure 1, Item 1).
2. Remove two screws (Figure 1, Item 2), washers (Figure 1, Item 3), and lockwashers (Figure 1, Item 4).
3. Remove locknut (Figure 1, Item 5), spacer (Figure 1, Item 6), two washers (Figure 1, Item 7), screw (Figure 1, Item 8), screw (Figure 1, Item 9), lockwasher (Figure 1, Item 10), washer (Figure 1, Item 11), and door support bracket (Figure 1, Item 12).
4. Remove locknut (Figure 1, Item 13), spacer (Figure 1, Item 14), two washers (Figure 1, Item 15), screw (Figure 1, Item 16), and link (Figure 1, Item 17).
5. Remove screw (Figure 1, Item 18), washer (Figure 1, Item 19), lockwasher (Figure 1, Item 20), and door support bracket (Figure 1, Item 21).

REMOVAL - Continued

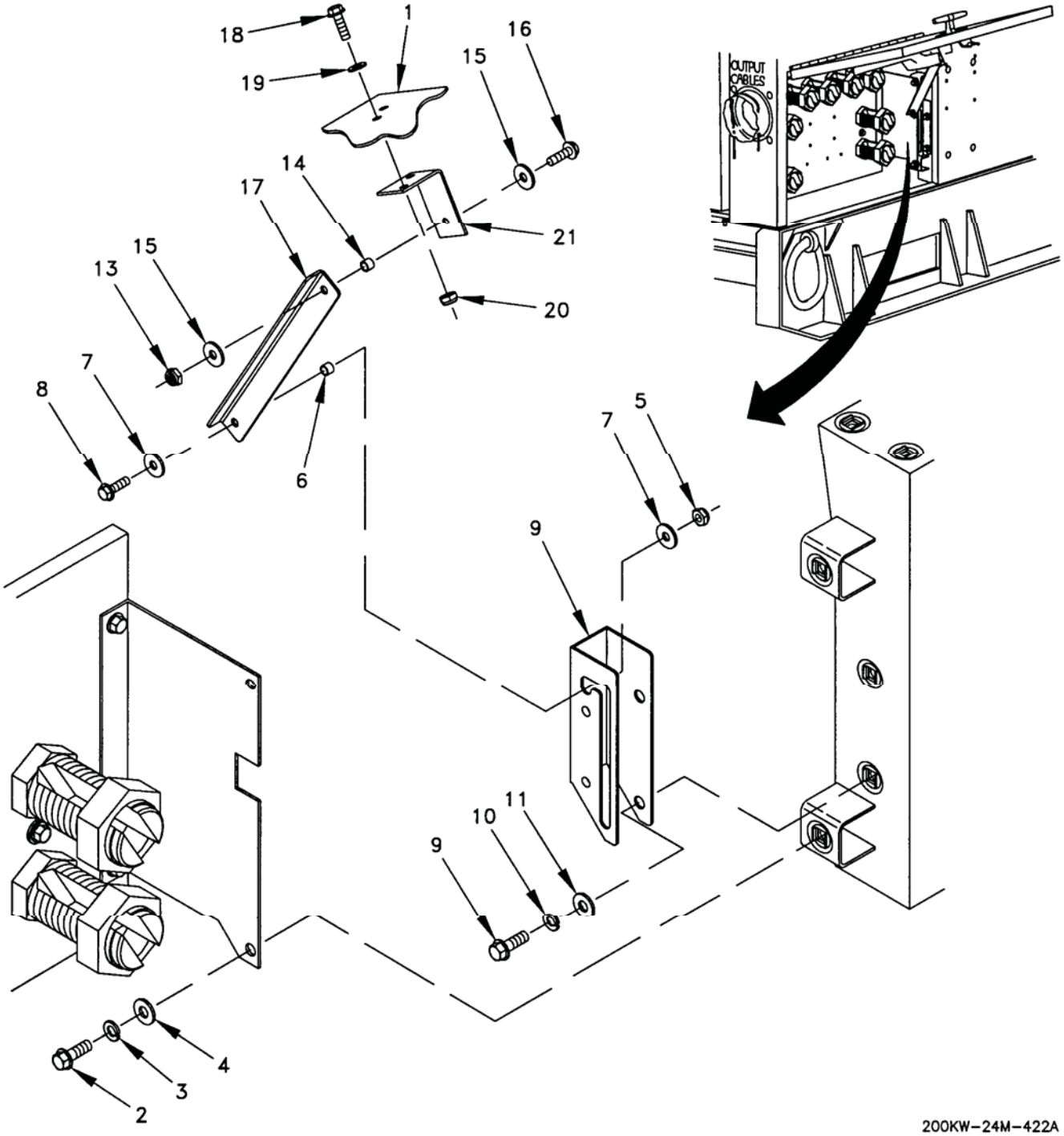

Figure 1. Door Support Assembly.

END OF TASK

INSTALLATION

1. Install door support bracket (Figure 1, Item 21), and secure with lockwasher (Figure 1, Item 20), washer (Figure 1, Item 19), and screw (Figure 1, Item 18).

2. Install link (Figure 1, Item 17), screw (Figure 1, Item 16), two washers (Figure 1, Item 15), spacer (Figure 1, Item 14), and locknut (Figure 1, Item 13).

3. Install door support bracket (Figure 1, Item 12), and secure with washer (Figure 1, Item 11), lockwasher (Figure 1, Item 10), screw (Figure 1, Item 9), screw (Figure 1, Item 8), two washers (Figure 1, Item 7), spacer (Figure 1, Item 6), and locknut (Figure 1, Item 5).

4. Install door support bracket (Figure 1, Item 9) on load board door (Figure 1, Item 1) with two lockwashers (Figure 1, Item 4), washers (Figure 1, Item 3), and screws (Figure 1, Item 2).

5. Close load board door (Figure 1, Item 1).

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

CONTROL BOX PANEL ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)
Multimeter 146-4080

Materials/Parts

Sealing compound (WP 0124, Item 40)

Personnel Required

One

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

NOTE

Table 1 lists removal/installation steps for significant components.

Table 1. WP 0041 Guide.

NAME	FIGURE ITEM	REMOVAL STEPS	DISASSEMBLY STEPS	ASSEMBLY STEPS	INSTALLATION STEPS	TESTING
Generator Set Control (GSC)	12	1 thru 3	1 and 2	20 and 21	1 thru 5	-
Alarm Module A2	55	1 thru 3	12	10	1 thru 4	-
VOLTAGE Adjust Potentiometer	73	16	-	-	6	1 thru 7
FREQUENCY Adjust Potentiometer	75	16	-	-	6	1 thru 10

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is set to OFF/RESET, Battery Disconnect Switch is set to OFF, and DEAD CRANK SWITCH is set to OFF before proceeding.

2. Turn two latches (Figure 1, Sheet 1, Item 1) and open control box door (Figure 1, Sheet 1, Item 2). Refer to Table 1 for removal/installation steps for specific control box panel assembly items. Tag and disconnect wiring to components before removing them.

3. Release three studs (Figure 1, Sheet 1, Item 3) and lower control box panel assembly (Figure 1, Sheet 1, Item 4).

NOTE

Control box panel assembly components can be removed without removing control box panel assembly.

4. Remove three nuts (Figure 1, Sheet 2, Item 5) to remove control box panel assembly (Figure 1, Sheet 1, Item 4) from hinges (Figure 1, Sheet 3, Item 6).

5. Unhook holder (Figure 1, Sheet 1, Item 7) from control box (Figure 1, Sheet 1, Item 8) and remove control box panel assembly (Figure 1, Sheet 1, Item 4) from control box.

REMOVAL - Continued

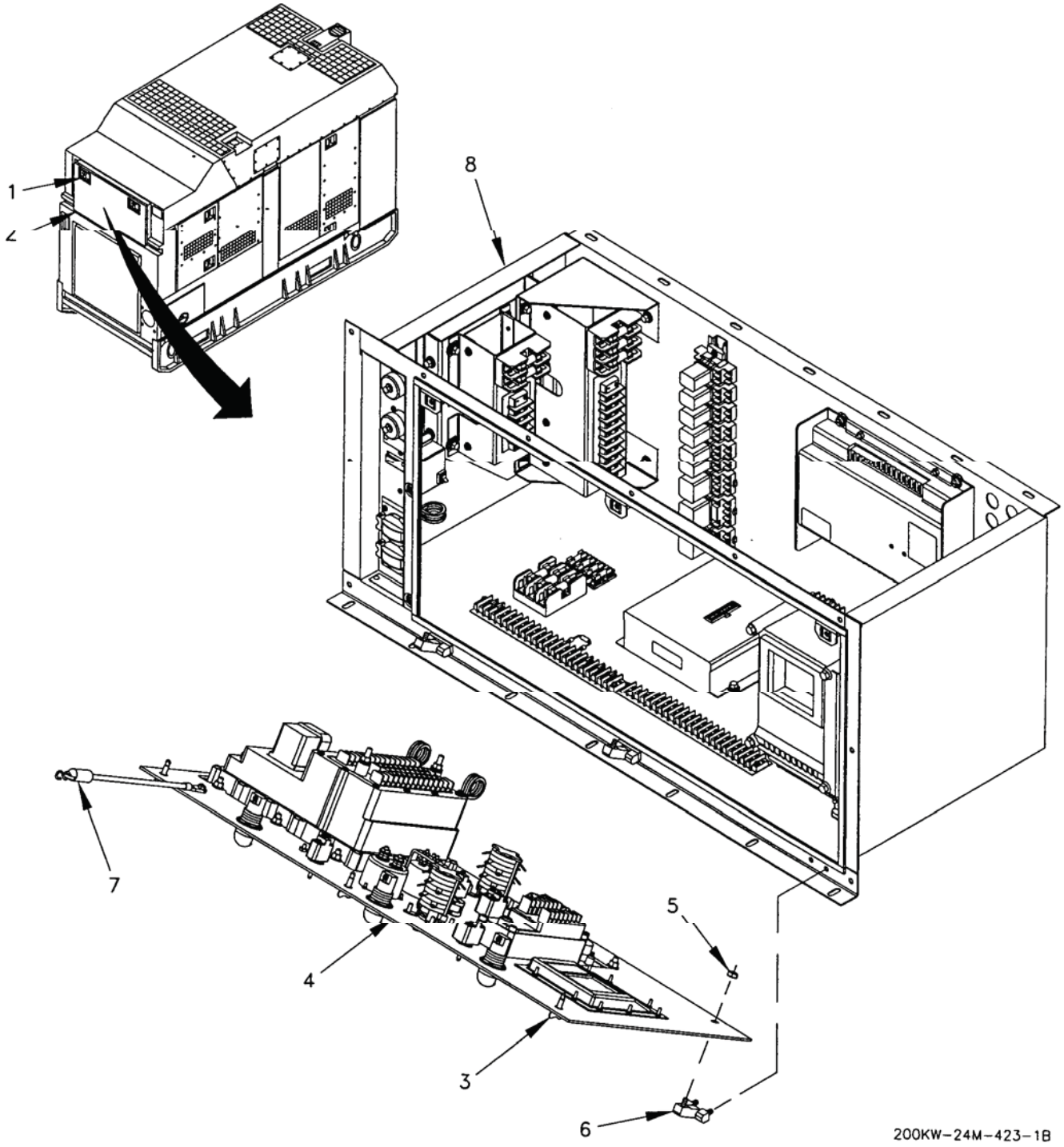

Figure 1. Control Box Panel Assembly (Sheet 1 of 4).

REMOVAL - Continued

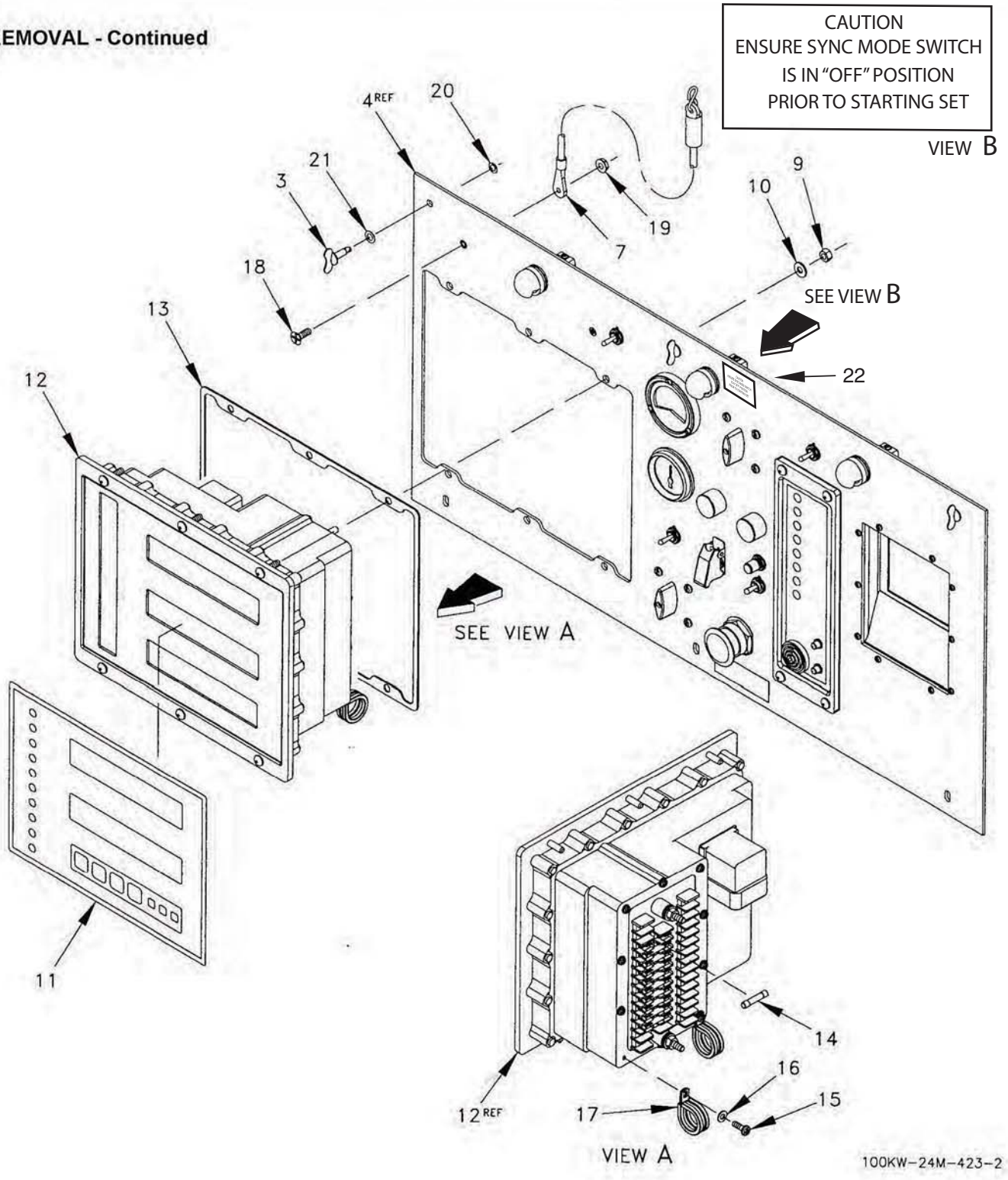

Figure 1. Control Box Panel Assembly (Sheet 2 of 4).

REMOVAL - Continued

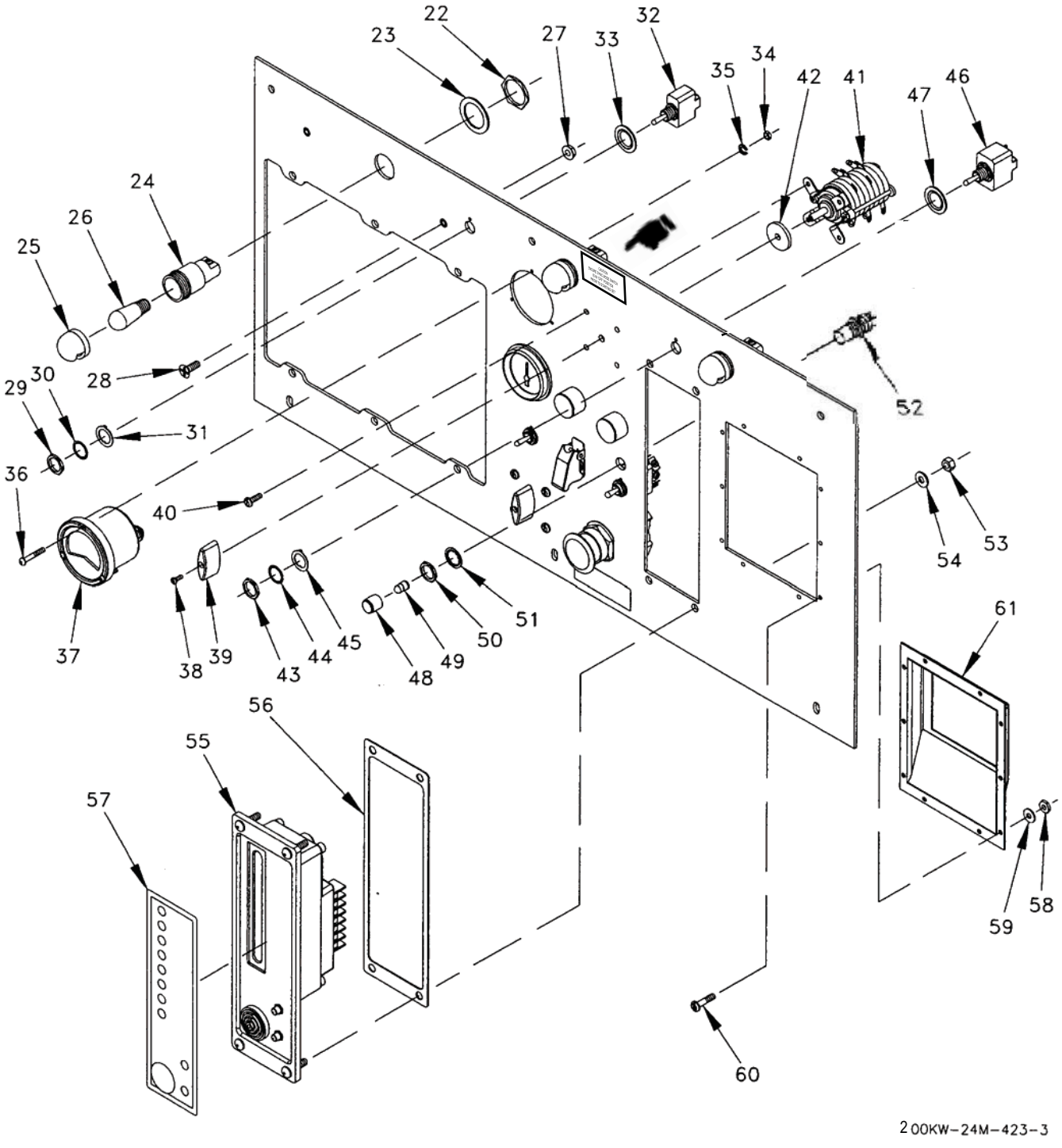

Figure 1. Control Box Panel Assembly (Sheet 3 of 4).

REMOVAL - Continued

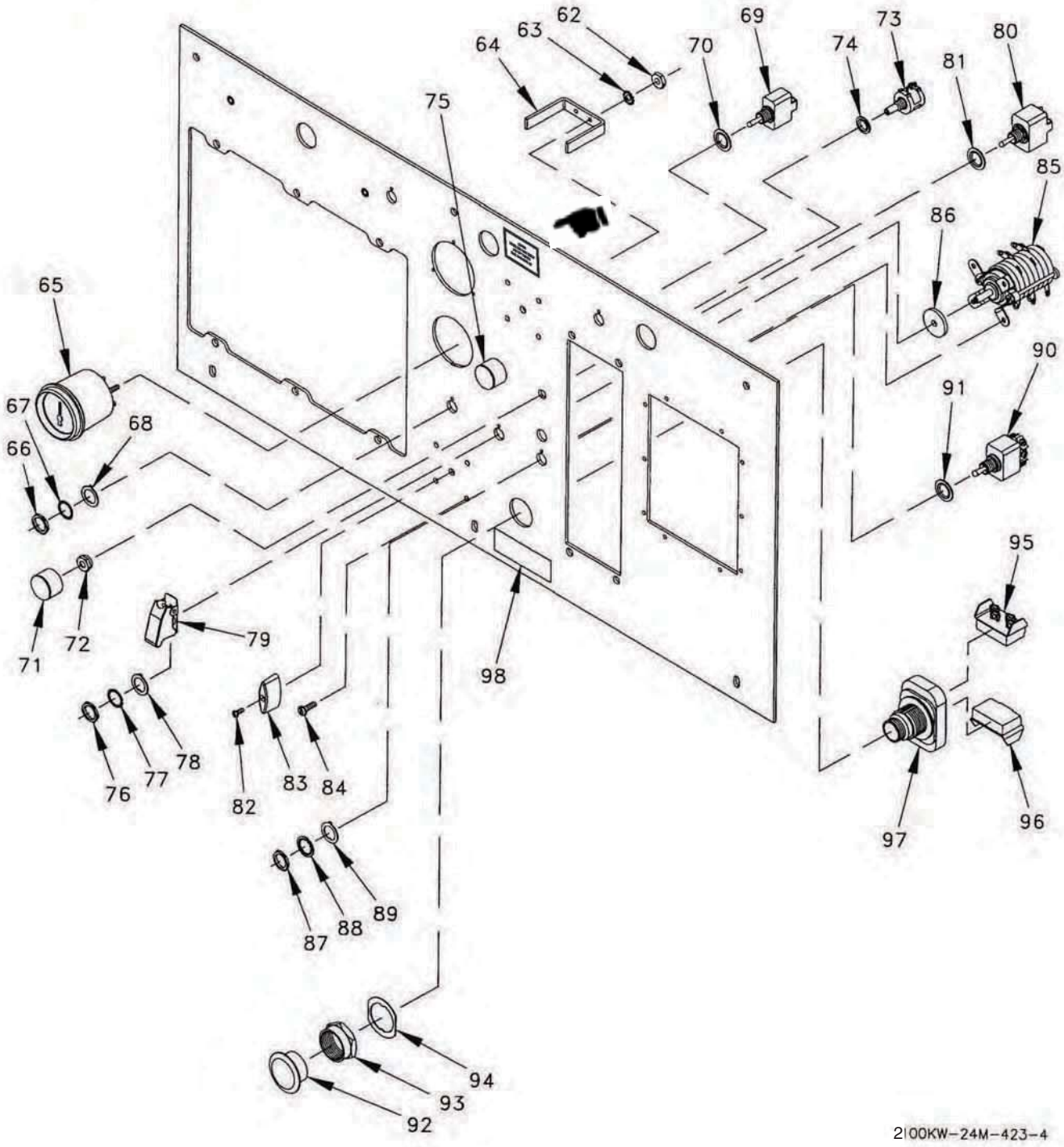

Figure 1. Control Box Panel Assembly (Sheet 4 of 4).

END OF TASK

DISASSEMBLY

1. Loosen screw on front of mating connector using 4mm Allen wrench to disconnect connector P7 and remove six locknuts (Figure 1, Sheet 2, Item 9) six washers (Figure 1, Sheet 2, Item 10), film (Figure 1, Sheet 2, Item 11), generator set control (GSC) (Figure 1, Sheet 2, Item 12), and seal (Figure 1, Sheet 2, Item 13).

2. Remove 10 fuses (Figure 1, Sheet 2, Item 14), two screws (Figure 1, Sheet 2, Item 15), two washers (Figure 1, Sheet 2, Item 16), and two loop clamps (Figure 1, Sheet 2, Item 17).

3. Remove screw (Figure 1, Sheet 2, Item 18), nut (Figure 1, Sheet 2, Item 19), and holder (Figure 1, Sheet 1, Item 7).

4. Remove three retainers (Figure 1, Sheet 2, Item 20), washers (Figure 1, Sheet 2, Item 21), and studs (Figure 1, Sheet 1, Item 3).

5. Remove nut (Figure 1, Sheet 3, Item 22), washer (Figure 1, Sheet 3, Item 23), panel light (Figure 1, Sheet 3, Item 24), lens (Figure 1, Sheet 3, Item 25), and lamp (Figure 1, Sheet 3, Item 26). Repeat for other two panel lights.

6. Remove nut (Figure 1, Sheet 3, Item 27) and screw (Figure 1, Sheet 3, Item 28).

7. Remove nut (Figure 1, Sheet 3, Item 29), washer (Figure 1, Sheet 3, Item 30), anti-rotation washer (Figure 1, Sheet 3, Item 31), PANEL LIGHT switch (Figure 1, Sheet 3, Item 32), and seal (Figure 1, Sheet 3, Item 33).

8. Remove three nuts (Figure 1, Sheet 3, Item 34), lockwashers (Figure 1, Sheet 3, Item 35), screws (Figure 1, Sheet 3, Item 36), and DC ammeter (Figure 1, Sheet 3, Item 37).

9. Remove screw (Figure 1, Sheet 3, Item 38), knob (Figure 1, Sheet 3, Item 39), four screws (Figure 1, Sheet 3, Item 40), SYNC MODE switch (Figure 1, Sheet 3, Item 41), and seal (Figure 1, Sheet 3, Item 42).

10. Remove nut (Figure 1, Sheet 3, Item 43), washer (Figure 1, Sheet 3, Item 44), anti-rotation washer (Figure 1, Sheet 3, Item 45), PARALLEL/UNIT switch (Figure 1, Sheet 3, Item 46), and seal washer (Figure 1, Sheet 3, Item 47).

11. Remove lens (Figure 1, Sheet 3, Item 48), lamp (Figure 1, Sheet 3, Item 49), nut (Figure 1, Sheet 3, Item 50), washer (Figure 1, Sheet 3, Item 51), and indicator light (Figure 1, Sheet 3, Item 52).

12. Remove four locknuts (Figure 1, Sheet 3, Item 53), washers (Figure 1, Sheet 3, Item 54), custom alarm module (Figure 1, Sheet 3, Item 55), and gasket (Figure 1, Sheet 3, Item 56). If necessary, remove film (Figure 1, Sheet 3, Item 57).

13. Remove ten locknuts (Figure 1, Sheet 3, Item 58), washers (Figure 1, Sheet 3, Item 59), screws (Figure 1, Sheet 3, Item 60), and DVR adapter (Figure 1, Sheet 3, Item 61).

14. Remove two nuts (Figure 1, Sheet 4, Item 62), lockwashers (Figure 1, Sheet 4, Item 63), bracket (Figure 1, Sheet 4, Item 64), and fuel level indicator (Figure 1, Sheet 4, Item 65).

15. Remove nut (Figure 1, Sheet 4, Item 66), washer (Figure 1, Sheet 4, Item 67), anti-rotation washer (Figure 1, Sheet 4, Item 68), AUX FUEL switch (Figure 1, Sheet 4, Item 69), and seal (Figure 1, Sheet 4, Item 70).

DISASSEMBLY - Continued

NOTE

VOLTAGE and FREQUENCY adjust potentiometers should be tested prior to removal.

16. Remove knob (Figure 1, Sheet 4, Item 71) using Allen wrench to unscrew setscrew, nut (Figure 1, Sheet 4, Item 72), VOLTAGE adjust potentiometer (Figure 1, Sheet 4, Item 73), and seal (Figure 1, Sheet 4, Item 74). Repeat for FREQUENCY adjust potentiometer (Figure 1, Sheet 4, Item 75).

17. Remove nut (Figure 1, Sheet 4, Item 76), washer (Figure 1, Sheet 4, Item 77), anti-rotation washer (Figure 1, Sheet 4, Item 78), switch guard (Figure 1, Sheet 4, Item 79), BATTLE SHORT switch (Figure 1, Sheet 4, Item 80), and seal (Figure 1, Sheet 4, Item 81).

18. Remove screw (Figure 1, Sheet 4, Item 82), knob (Figure 1, Sheet 4, Item 83), four screws (Figure 1, Sheet 4, Item 84), ENGINE CONTROL switch (Figure 1, Sheet 4, Item 85), and seal (Figure 1, Sheet 4, Item 86).

19. Remove nut (Figure 1, Sheet 4, Item 87), washer (Figure 1, Sheet 4, Item 88), four screws (Figure 1, Sheet 4, Item 89), AC CIRCUIT INTERRUPTER switch (Figure 1, Sheet 4, Item 90), and seal washer (Figure 1, Sheet 4, Item 91).

20. Remove lens (Figure 1, Sheet 4, Item 92), nut (Figure 1, Sheet 4, Item 93), seal (Figure 1, Sheet 4, Item 94), two block contacts (Figure 1, Sheet 4, Item 95) and (Figure 1, Sheet 4, Item 96), and PUSH TO STOP EMERGENCY STOP switch (Figure 1, Sheet 4, Item 97).

21. If necessary, remove label (Figure 1, Sheet 4, Item 98).

END OF TASK

TESTING

VOLTAGE Adjust Potentiometer Test

1. Disconnect wires from terminals 7 and 45 of DVR A3.

2. Set multimeter to measure 10,000 ohms and connect multimeter leads to wires removed from terminals 7 and 45 of DVR A3.

3. Rotate potentiometer shaft counterclockwise as far as it will go.

4. Slowly and smoothly rotate VOLTAGE adjust potentiometer shaft clockwise as far as it will go while observing multimeter.

5. Multimeter indication shall increase at an even rate from 0 - 10,000 ohms. Maximum resistance may vary + or – 1000 ohms.

6. If multimeter indication changes erratically or is not at maximum ohms when rotation is complete, the potentiometer is defective and must be replaced.

7. If there is no continuity at any position of potentiometer, troubleshoot wiring between potentiometer and DVR A3 or replace potentiometer.

TESTING - Continued

FREQUENCY Adjust Potentiometer Test

1. Disconnect wires from terminals 26, 27, and 28 of LSM A4.
2. Set multimeter to measure 10,000 ohms and connect multimeter leads to wires removed from terminals 27and 28 of LSM A4.
3. Rotate potentiometer shaft counterclockwise as far as it will go.
4. Slowly and smoothly rotate FREQUENCY adjust potentiometer shaft clockwise as far as it will go while observing multimeter and note indication.
5. Connect multimeter leads to wires removed from terminals 26 and 27 of LSM A4.
6. Rotate potentiometer shaft clockwise as far as it will go.
7. Slowly and smoothly rotate FREQUENCY adjust potentiometer shaft counterclockwise as far as it will go while observing multimeter.
8. Multimeter indication shall increase at an even rate from 0-10,000 ohms for each setup. Maximum resistance may vary + or – 1000 ohms.
9. If multimeter indication changes erratically or is not at maximum ohms when rotation is complete, the potentiometer is defective and must be replaced.
10. If there is no continuity at any position of potentiometer, troubleshoot wiring between potentiometer and LSM A4 or replace potentiometer.

END OF TASK

ASSEMBLY

1. If removed, remove label (Figure 1, Sheet 4, Item 98).
2. Install PUSH TO STOP EMERGENCY STOP switch (Figure 1, Sheet 4, Item 97), two block contacts (Figure 1, Sheet 4, Item 96) and (Figure 1, Sheet 4, Item 95), seal (Figure 1, Sheet 4, Item 94), nut (Figure 1, Sheet 4, Item 93), and lens (Figure 1, Sheet 4, Item 92).
3. Install seal washer (Figure 1, Sheet 4, Item 91), AC CIRCUIT INTERRUPTER switch (Figure 1, Sheet 4, Item 90), four screws (Figure 1, Sheet 4, Item 89), washer (Figure 1, Sheet 4, Item 88), and nut (Figure 1, Sheet 4, Item 87).
4. Install seal (Figure 1, Sheet 4, Item 86), ENGINE CONTROL switch (Figure 1, Sheet 4, Item 85), four screws (Figure 1, Sheet 4, Item 84), knob (Figure 1, Sheet 4, Item 83), and screw (Figure 1, Sheet 4, Item 82).
5. Install seal (Figure 1, Sheet 4, Item 81), BATTLE SHORT switch (Figure 1, Sheet 4, Item 80), switch guard (Figure 1, Sheet 4, Item 79), anti-rotation washer (Figure 1, Sheet 4, Item 78), washer (Figure 1, Sheet 4, Item 77), and nut (Figure 1, Sheet 4, Item 76).
6. Install FREQUENCY adjust potentiometer (Figure 1, Sheet 4, Item 75), seal (Figure 1, Sheet 4, Item 74), nut (Figure 1, Sheet 4, Item 72), and knob (Figure 1, Sheet 4, Item 71). Repeat for VOLTAGE adjust potentiometer (Figure 1, Sheet 4, Item 73).

ASSEMBLY - Continued

7. Install seal (Figure 1, Sheet 4, Item 70), AUX FUEL switch (Figure 1, Sheet 4, Item 69), anti-rotation washer (Figure 1, Sheet 4, Item 68), washer (Figure 1, Sheet 4, Item 67), and nut (Figure 1, Sheet 4, Item 66).

8. Install fuel level indicator (Figure 1, Sheet 4, Item 65), bracket (Figure 1, Sheet 4, Item 64), two lockwashers (Figure 1, Sheet 4, Item 63), and nuts (Figure 1, Sheet 4, Item 62).

9. Install DVR adapter (Figure 1, Sheet 3, Item 61), ten screws (Figure 1, Sheet 3, Item 60), washers (Figure 1, Sheet 3, Item 59), and locknuts (Figure 1, Sheet 3, Item 58).

10. If removed, install film (Figure 1, Sheet 3, Item 57) on custom alarm module (Figure 1, Sheet 3, Item 55). Install gasket (Figure 1, Sheet 3, Item 56), custom alarm module (Figure 1, Sheet 3, Item 55), four washers (Figure 1, Sheet 3, Item 54), and locknuts (Figure 1, Sheet 3, Item 53).

11. Install indicator light (Figure 1, Sheet 3, Item 52), washer (Figure 1, Sheet 3, Item 51), nut (Figure 1, Sheet 3, Item 50), lamp (Figure 1, Sheet 3, Item 49), and lens (Figure 1, Sheet 3, Item 48).

12. Install seal washer (Figure 1, Sheet 3, Item 47), PARALLEL/UNIT switch (Figure 1, Sheet 3, Item 46), anti-rotation washer (Figure 1, Sheet 3, Item 45), washer (Figure 1, Sheet 3, Item 44), and nut (Figure 1, Sheet 3, Item 43).

13. Install seal (Figure 1, Sheet 3, Item 42), SYNC MODE switch (Figure 1, Sheet 3, Item 41), SYNC MODE switch caution label (Figure1, Sheet 2, Item 22, if not installed), four screws (Figure 1, Sheet 3, Item 40), knob (Figure 1, Sheet 3, Item 39), and screw (Figure 1, Sheet 3, Item 38).

14. Install DC ammeter (Figure 1, Sheet 3, Item 37), three screws (Figure 1, Sheet 3, Item 36), lockwashers (Figure 1, Sheet 3, Item 35), and nuts (Figure 1, Sheet 3, Item 34).

15. Install seal (Figure 1, Sheet 3, Item 33), PANEL LIGHT switch (Figure 1, Sheet 3, Item 32), anti-rotation washer (Figure 1, Sheet 3, Item 31), washer (Figure 1, Sheet 3, Item 30), and nut (Figure 1, Sheet 3, Item 29).

16. Install screw (Figure 1, Sheet 3, Item 28) and nut (Figure 1, Sheet 3, Item 27).

17. Install lamp (Figure 1, Sheet 3, Item 26), lens (Figure 1, Sheet 3, Item 25), panel light (Figure 1, Sheet 3, Item 24), washer (Figure 1, Sheet 3, Item 23), and nut (Figure 1, Sheet 3, Item 22). Repeat for other two panel lights.

18. Install three studs (Figure 1, Sheet 1, Item 3), washers (Figure 1, Sheet 2, Item 21), and retainers (Figure 1, Sheet 2, Item 20).

19. Install holder (Figure 1, Sheet 1, Item 7), nut (Figure 1, Sheet 2, Item 19), and screw (Figure 1, Sheet 2, Item 18).

20. Install two loop clamps (Figure 1, Sheet 2, Item 17), two washers (Figure 1, Sheet 2, Item 16), two screws (Figure 1, Sheet 2, Item 15), and ten fuses (Figure 1, Sheet 2, Item 14).

21. Install seal (Figure 1, Sheet 2, Item 13), generator set control (GSC) (Figure 1, Sheet 2, Item 12), film (Figure 1, Sheet 2, Item 11), six washers (Figure 1, Sheet 2, Item 10) and six locknuts (Figure 1, Sheet 1, Item 9).

22. Install connector P7 and tighten screw on front of mating connector using 4mm Allen wrench.

END OF TASK

INSTALLATION

1. Install control box panel assembly (Figure 1, Sheet 1, Item 4) on control box (Figure 1, Sheet 1, Item 8) and hook holder (Figure 1, Sheet 3, Item 7) to control box.

NOTE

Remove tags and connect wiring as required.

2. Install control panel assembly (Figure 1, Sheet 1, Item 4) onto three hiinges (Figure 1, Sheet 1, Item 6) and secure with nuts (Figure 1, Sheet 1, Item 5).
3. Raise control box panel assembly (Figure 1, Sheet 1, Item 4) and secure three studs (Figure 1, Sheet 1, Item 3).
4. Close control box door (Figure 1, Sheet 1, Item 2), and turn two latches (Figure 1, Sheet 1, Item 1) to secure.
5. Restore power by setting DEAD CRANK SWITCH to NORMAL, Battery Disconnect Switch ON, and ENGINE CONTROL switch to OFF/RESET.
6. If GSC has been removed and installed, reprogram to restore required generator set values and parameters (WP 0083).
7. If sync mode switch label (Figure 1, Sheet 2, Item 22) is not present, apply it over the sync mode switch (Figure 1, Sheet 3, Item 39).

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
CONTROL BOX ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

References

TM 9-6115-730-24P

Materials/Parts

Gasket

Equipment Condition

Front roof section removed (WP 0030)

Personnel Required

One

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is set to OFF/RESET, Battery Disconnect Switch is set to OFF, and DEAD CRANK SWITCH is OFF before proceeding.
2. Tag and disconnect harness connector P30 from Control Box connector J30.
3. Tag and disconnect harness connector P31 from Control Box connector J31.
4. Tag and disconnect ECM to EMCP harness connector ENG-P37 from Control Box connector J37.
5. Remove ground wire (Figure 1, Item 1), washer (Figure 1, Item 2) and locknut (Figure 1, Item 3) from back of control box terminal (Figure 1, Item 4).
6. Remove seven screws (Figure 1, Item 5), lockwashers (Figure 1, Item 6), and washers (Figure 1, Item 7).

REMOVAL - Continued

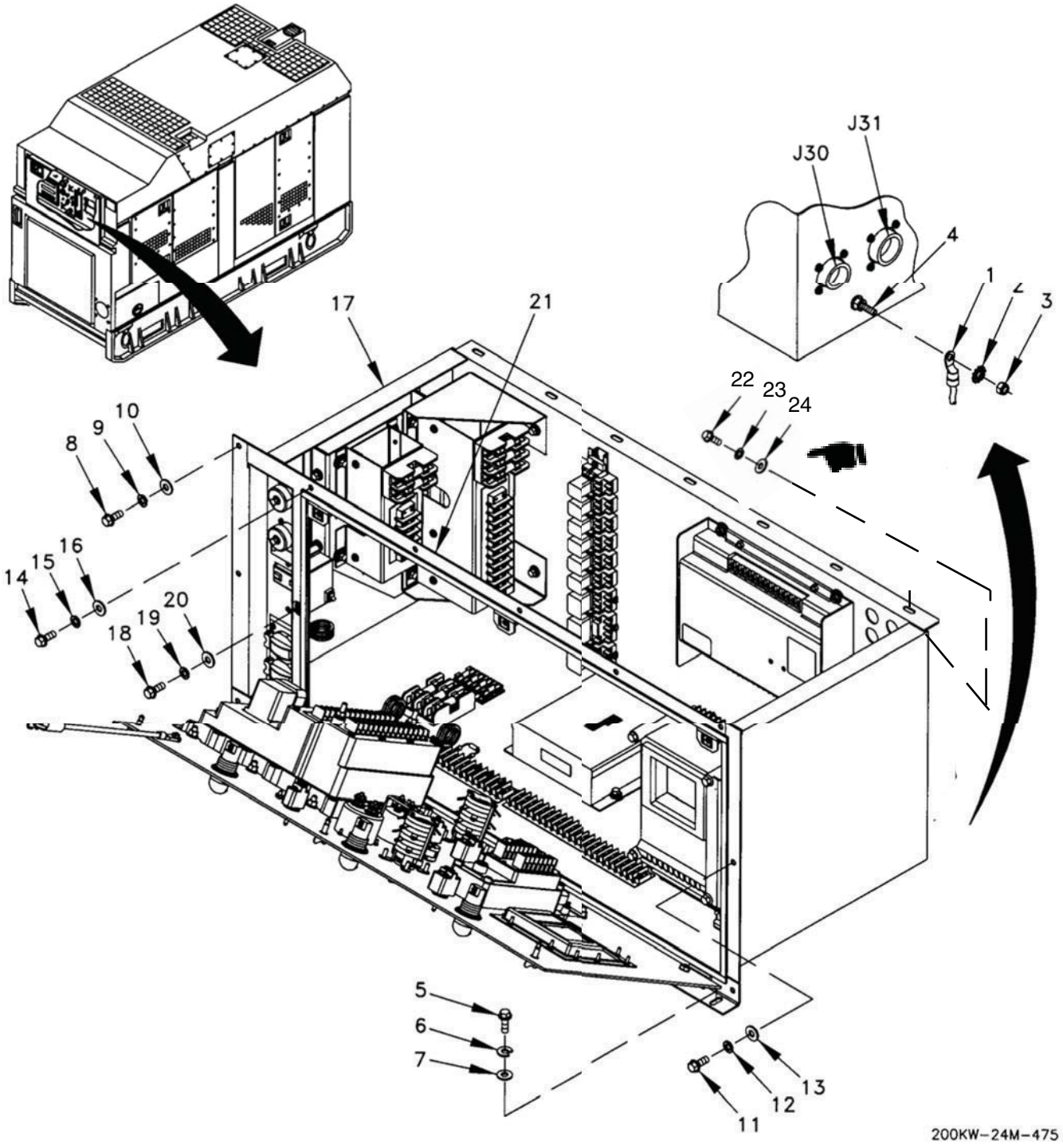

Figure 1. Control Box.

REMOVAL - Continued

7. Remove three screws (Figure 1, Item 8), lockwashers (Figure 1, Item 9), and washers (Figure 1, Item 10).
8. Remove two screws (Figure 1, Item 11), lockwashers (Figure 1, Item 12), and washers (Figure 1, Item 13).
9. Remove five screws (Figure 1, Item 14), lockwashers (Figure 1, Item 15), and washers (Figure 1, Item 16).
10. Remove seven screws (Figure 1, Item 22), lockw ashers (Figure 1, Item 23), and washers (Figure 1, Item 24).
11. Slide Control Box (Figure 1, Item 17) out of generator set and place on suitable work surface.
12. If necessary, remove two screws (Figure 1, Item 18), lockwashers (Figure 1, Item 19), washers (Figure 1, Item 20), and brace (Figure 1, Item 21).

END OF TASK

DISASSEMBLY

NOTE

Disassembly of the control panel can be accomplished on or off the generator set, however access to some components may be improved if control box is removed. Table 1 lists specific steps for disassembly and assembly of significant control box components.

Table 1. WP 0042 Guide.

NAME	FIGURE 2 ITEM	DISASSEMBLY STEPS	ASSEMBLY STEPS	RELATED STEPS
AC Transformer Box (ATB) A5	45	1, 2, and 14	16	
Alarm Reset (AR)	73	1, 2, and 20	10	
Auxiliary Fuel Pump Relay (AFPR)	72	1, 2, and 20	10	
Bus Transformer Box (BTB) A6	19	1, 2, and 7	23	
Cool Down Relay (CDR)	71	1, 2, and 20	10	
Dead Bus Relay, High Voltage Sensing (DBHI)	79	1, 2, and 21	9	
Dead Bus Relay, Low Voltage Sensing (DBLO)	78	1, 2, and 21	9	
Digital Voltage Regulator (DVR) A3	98	1, 2, and 26	4	
Relay Field Flash (KFF)	75	1, 2, and 20	10	
Generator Fault Relay (GFR)	74	1, 2, and 20	10	
Ground Fault Circuit Interrupter (GFCI)	42	1, 2, and 13	17	
Load Sharing Module (LSM) A4	28	1, 2, and 9	21	Adjustment 1 thru 4

DISASSEMBLY - Continued

Table 1. WP 0042 Guide - Continued.

NAME	FIGURE 2 ITEM	DISASSEMBLY STEPS	ASSEMBLY STEPS	RELATED STEPS
Main Contactor Relay (KR)	70	1, 2, and 20	10	
Overload/Short Circuit Module	24	1, 2, and 8	22	
Paralleling Relay (PAR)	81	1, 2, and 22	8	
Resistor Assembly A7	112	1, 2, and 28	2	

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is set to OFF/RESET, Battery Disconnect Switch is set to OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Open control box door and control box panel assembly. Control box panel assembly may be removed for access if necessary (WP 0041).

3. Remove three receptacles (Figure 2, Sheet 1, Item 1).

4. To remove terminal block TB4 (Figure 2, Sheet 1, Item 2), remove two nuts (Figure 2, Sheet 1, Item 3), screws (Figure 2, Sheet 1, Item 4), terminal block, and strip (Figure 2, Sheet 1, Item 5). Remove ten screws (Figure 2, Sheet 1, Item 6) and jumpers (Figure 2, Sheet 1, Item 7). Repeat for terminal block TB3. On TB4 only, remove two screws (Figure 2, Sheet 1, Item 8), diode (Figure 2, Sheet 1, Item 9), and two spade terminals (Figure 2, Sheet 1, Item 10).

5. To remove fuse block (Figure 2, Sheet 1, Item 11), remove three fuses (Figure 2, Sheet 1, Item 12), two nuts (Figure 2, Sheet 1, Item 13), two screws (Figure 2, Sheet 1, Item 14), and fuse block.

6. To remove fuse block (Figure 2, Sheet 2, Item 15), remove four fuses (Figure 2, Sheet 2, Item 16), two nuts (Figure 2, Sheet 2, Item 17), two screws (Figure 2, Sheet 2, Item 18), and fuse block.

7. To remove bus transformer box A6 (Figure 2, Sheet 2, Item 19), remove two fuses (Figure 2, Sheet 2, Item 20), four screws (Figure 2, Sheet 2, Item 21), four lockwashers (Figure 2, Sheet 2, Item 22), four washers (Figure 2, Sheet 2, Item 23), and transformer box.

8. To remove overload/short circuit relay (Figure 2, Sheet 2, Item 24), remove four screws (Figure 2, Sheet 2, Item 25), lockwashers (Figure 2, Sheet 2, Item 26), washers (Figure 2, Sheet 2, Item 27), and relay.

9. To remove load sharing module (LSM) A4 (Figure 2, Sheet 2, Item 28), remove four screws (Figure 2, Sheet 2, Item 29), washers (Figure 2, Sheet 2, Item 30), and load sharing module.

10. To remove duplex receptacle (Figure 2, Sheet 2, Item 31), remove four screws (Figure 2, Sheet 2, Item 32), cover (Figure 2, Sheet 2, Item 33), and receptacle.

11. To remove paralleling receptacle (Figure 2, Sheet 2, Item 34), remove four nuts (Figure 2, Sheet 2, Item 35), four screws (Figure 2, Sheet 2, Item 36), cover (Figure 2, Sheet 2, Item 37), and receptacle. Repeat for other paralleling receptacle.

12. To remove nameplate (Figure 2, Sheet 2, Item 38), (Figure 2, Sheet 2, Item 39), or (Figure 2, Sheet 2, Item 40), remove two rivets (Figure 2, Sheet 2, Item 41) and nameplate.

DISASSEMBLY - Continued

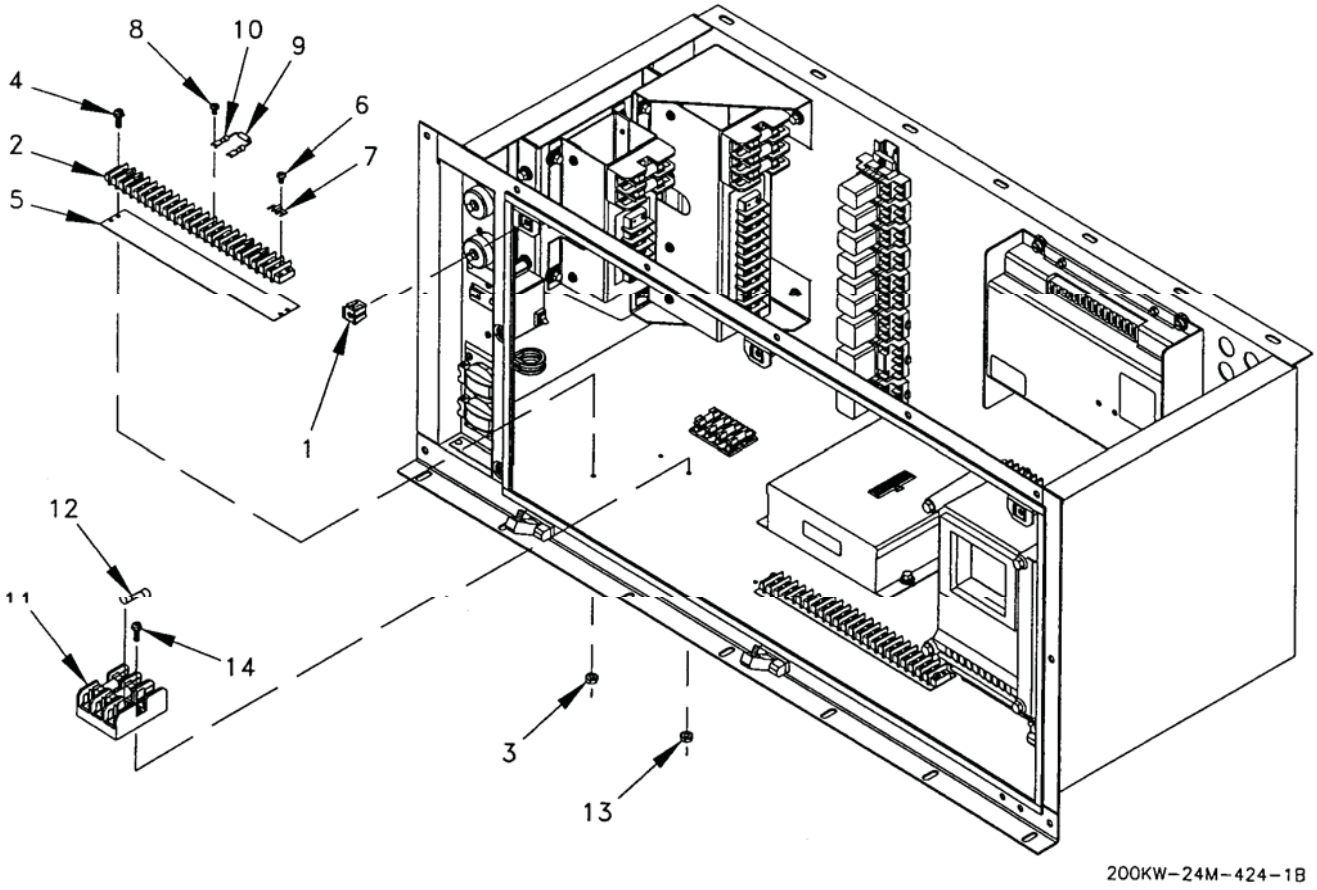

Figure 2. Control Box Assembly (Sheet 1 of 5).

DISASSEMBLY - Continued

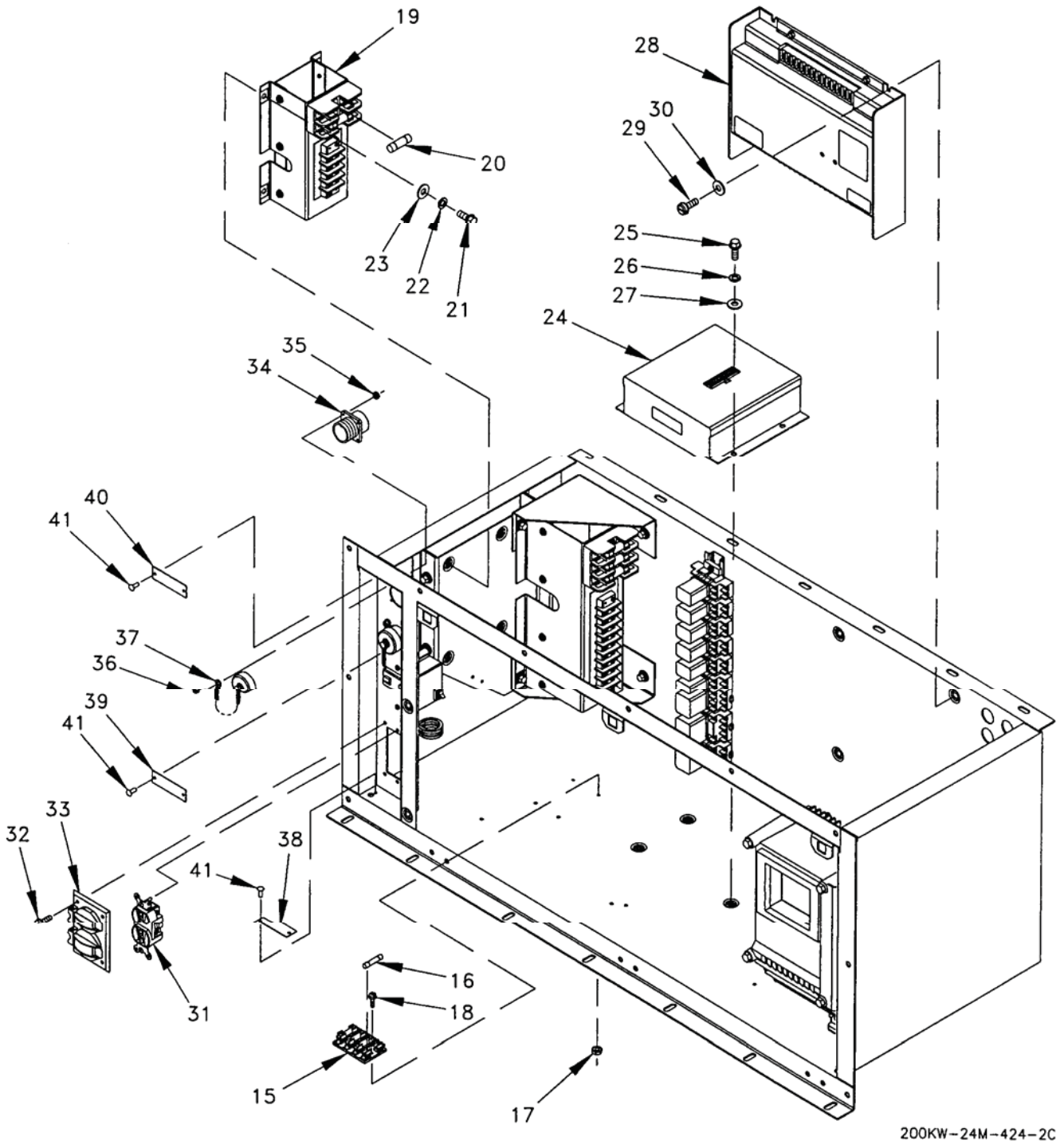

Figure 2. Control Box Assembly (Sheet 2 of 5).

DISASSEMBLY - Continued

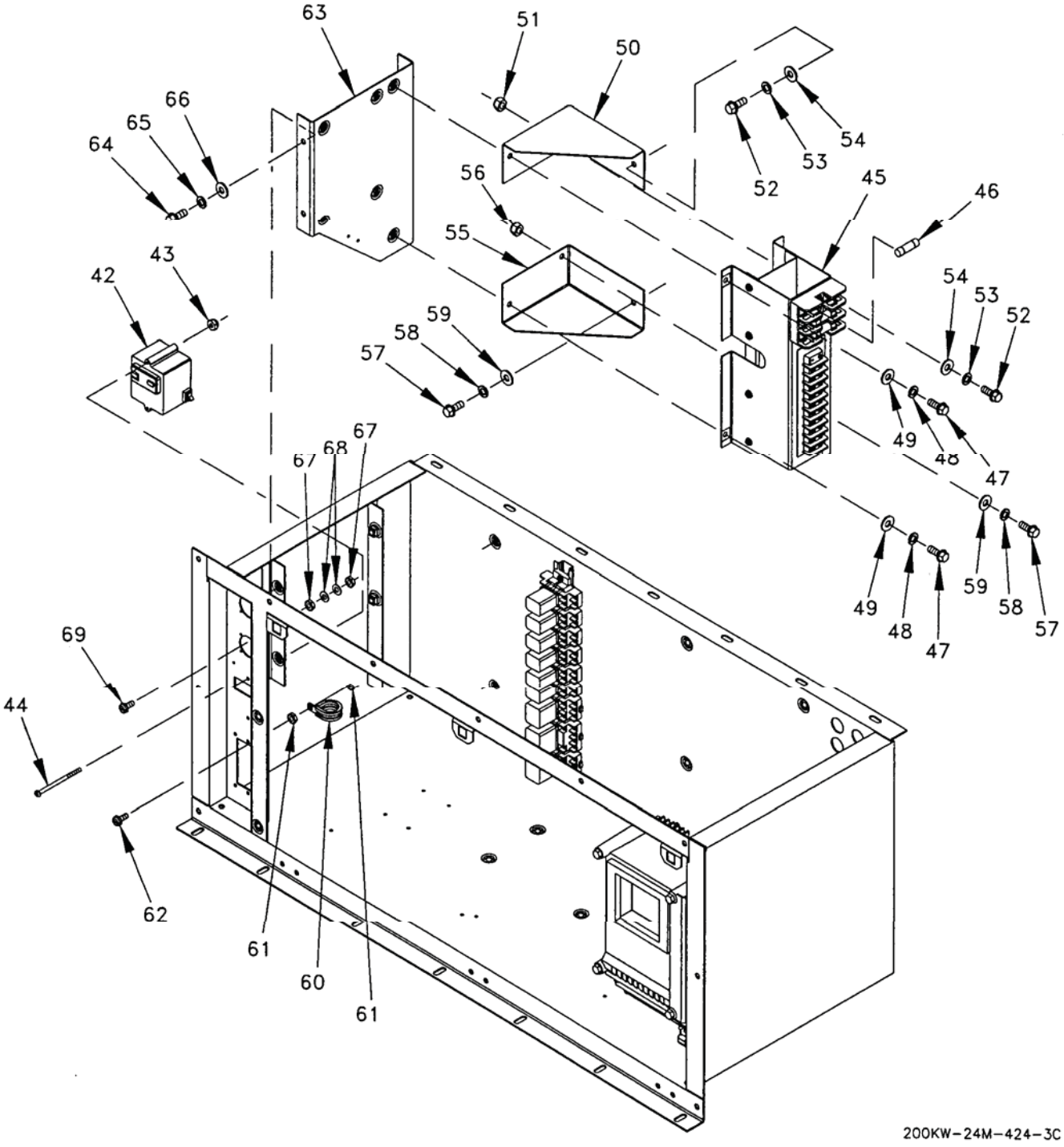

Figure 2. Control Box Assembly (Sheet 3 of 5).

DISASSEMBLY - Continued

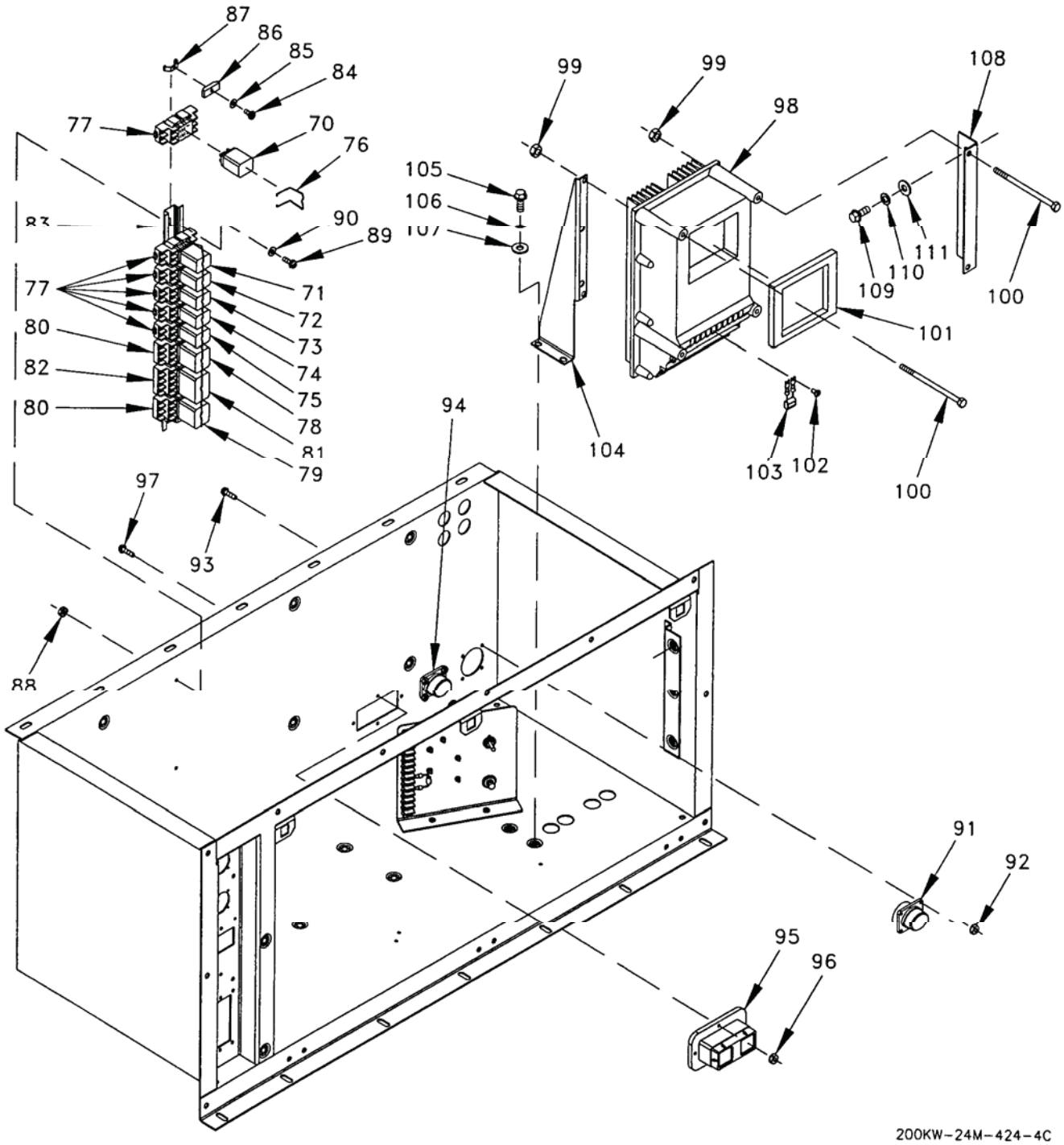

Figure 2. Control Box Assembly (Sheet 4 of 5).

DISASSEMBLY - Continued

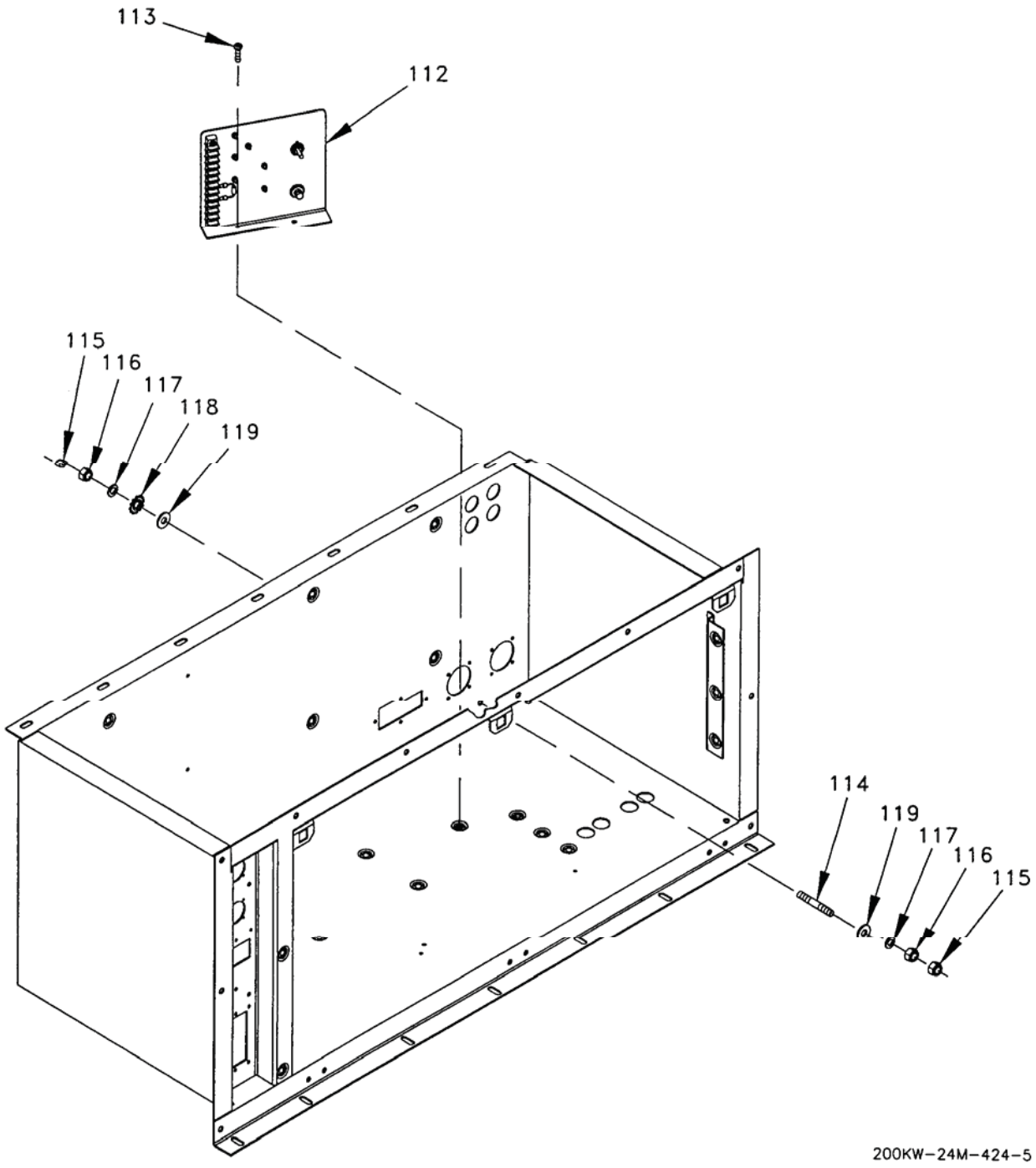

Figure 2. Control Box Assembly (Sheet 5 of 5).

DISASSEMBLY - Continued

13. To remove ground fault circuit interrupter GFCI (Figure 2, Sheet 3, Item 42), remove two nuts (Figure 2, Sheet 3, Item 43), screws (Figure 2, Sheet 3, Item 44), and circuit interrupter.

14. To remove AC transformer box A5 (Figure 2, Sheet 3, Item 45), remove three fuses (Figure 2, Sheet 3, Item 46), four screws (Figure 2, Sheet 3, Item 47), four lockwashers (Figure 2, Sheet 3, Item 48), four washers (Figure 2, Sheet 3, Item 49), and AC transformer box.

15. To remove upper transformer mounting bracket (Figure 2, Sheet 3, Item 50), remove nut (Figure 2, Sheet 3, Item 51), two screws (Figure 2, Sheet 3, Item 52), two lockwashers (Figure 2, Sheet 3, Item 53), two washers (Figure 2, Sheet 3, Item 54), and bracket.

16. To remove lower transformer mounting bracket (Figure 2, Sheet 3, Item 55), remove nut (Figure 2, Sheet 3, Item 56), two screws (Figure 2, Sheet 3, Item 57), two lockwashers (Figure 2, Sheet 3, Item 58), two washers (Figure 2, Sheet 3, Item 59), and bracket.

17. To remove loop clamp (Figure 2, Sheet 3, Item 60), remove nut (Figure 2, Sheet 3, Item 61), loop clamp, nut (Figure 2, Sheet 3, Item 61), and screw (Figure 2, Sheet 3, Item 62).

18. To remove component mounting channel (Figure 2, Sheet 3, Item 63), remove five screws (Figure 2, Sheet 3, Item 64), lockwashers (Figure 2, Sheet 3, Item 65), washers (Figure 2, Sheet 3, Item 66), and channel.

19. Remove nut (Figure 2, Sheet 3, Item 67), two washers (Figure 2, Sheet 3, Item 68), nut (Figure 2, Sheet 3, Item 67), and screw (Figure 2, Sheet 3, Item 69).

20. To remove relay KR (Figure 2, Sheet 4, Item 70), CDR (Figure 2, Sheet 4, Item 71), AFPR (Figure 2, Sheet 4, Item 72), AR (Figure 2, Sheet 4, Item 73), GFR (Figure 2, Sheet 4, Item 74), or KFF (Figure 2, Sheet 4, Item 75), remove spring (Figure 2, Sheet 4, Item 76), relay, and socket (Figure 2, Sheet 4, Item 77).

21. To remove relay DBLO (Figure 2, Sheet 4, Item 78) or DBHI (Figure 2, Sheet 4, Item 79), remove spring (Figure 2, Sheet 4, Item 76), relay, and socket (Figure 2, Sheet 4, Item 80).

22. To remove relay PAR (Figure 2, Sheet 4, Item 81), remove spring (Figure 2, Sheet 4, Item 76), relay, and socket (Figure 2, Sheet 4, Item 82).

23. To remove track (Figure 2, Sheet 4, Item 83), remove two screws (Figure 2, Sheet 4, Item 84), two washers (Figure 2, Sheet 4, Item 85), two insulator blocks (Figure 2, Sheet 4, Item 86), two clips (Figure 2, Sheet 4, Item 87), three nuts (Figure 2, Sheet 4, Item 88), three screws (Figure 2, Sheet 4, Item 89), three washers (Figure 2, Sheet 4, Item 90), and track.

24. To remove connector J30 (Figure 2, Sheet 4, Item 91), remove four nuts (Figure 2, Sheet 4, Item 92), screws (Figure 2, Sheet 4, Item 93), and connector. Repeat for connector J31 (Figure 2, Sheet 4, Item 94).

25. To remove connector J37 (Figure 2, Sheet 4, Item 95), remove four nuts (Figure 2, Sheet 4, Item 96), screws (Figure 2, Sheet 4, Item 97), and connector.

26. To remove digital voltage regulator (DVR) A3 (Figure 2, Sheet 4, Item 98), remove four nuts (Figure 2, Sheet 4, Item 99), screws (Figure 2, Sheet 4, Item 100), digital voltage regulator, and gasket (Figure 2, Sheet 4, Item 101). Remove two screws (Figure 2, Sheet 4, Item 102) and capacitor (Figure 2, Sheet 4, Item 103).

DISASSEMBLY - Continued

27. To remove DVR bracket (Figure 2, Sheet 4, Item 104), remove two screws (Figure 2, Sheet 4, Item 105), lockwashers (Figure 2, Sheet 4, Item 106), washers (Figure 2, Sheet 4, Item 107), and bracket. To remove DVR bracket (Figure 2, Sheet 4, Item 108), remove three screws (Figure 2, Sheet 4, Item 109), lockwashers (Figure 2, Sheet 4, Item 110), washers (Figure 2, Sheet 4, Item 111), and bracket.

28. To remove resistor assembly A7 (Figure 2, Sheet 5, Item 112), remove two screws, remove two lockwashers, 113A and two flat washers, 113B (Figure 2, Sheet 5, Item 113) and resistor assembly.

29. To remove ground stud (Figure 2, Sheet 5, Item 114), remove two locknuts (Figure 2, Sheet 5, Item 115), two jam nuts (Figure 2, Sheet 5, Item 116), two lockwashers (Figure 2, Sheet 5, Item 117), external tooth lockwasher (Figure 2, Sheet 5, Item 118), two washers (Figure 2, Sheet 5, Item 119), and ground stud.

END OF TASK

ASSEMBLY

1. Install ground stud (Figure 2, Sheet 5, Item 114), two washers (Figure 2, Sheet 5, Item 119), external tooth lockwasher (Figure 2, Sheet 5, Item 118), two lockwashers (Figure 2, Sheet 5, Item 117), two jam nuts (Figure 2, Sheet 5, Item 116), and two locknuts (Figure 2, Sheet 5, Item 115).

2. Install resistor assembly A7 (Figure 2, Sheet 5, Item 112) and two screws (Figure 2, Sheet 5, Item 113).

3. Install DVR bracket (Figure 2, Sheet 4, Item 108), three washers (Figure 2, Sheet 4, Item 111), lockwashers (Figure 2, Sheet 4, Item 110), and screws (Figure 2, Sheet 4, Item 109). Install DVR bracket (Figure 2, Sheet 4, Item 104), three washers (Figure 2, Sheet 4, Item 107), lockwashers (Figure 2, Sheet 4, Item 106), and screws (Figure 2, Sheet 4, Item 105).

4. Install capacitor (Figure 2, Sheet 4, Item 103) and two screws (Figure 2, Sheet 4, Item 102) on digital voltage regulator (DVR) A3 (Figure 2, Sheet 4, Item 98). Install gasket (Figure 2, Sheet 4, Item 101), digital voltage regulator (Figure 2, Sheet 4, Item 98), four screws (Figure 2, Sheet 4, Item 100), and nuts (Figure 2, Sheet 4, Item 99).

5. Install connector J37 (Figure 2, Sheet 4, Item 95), four screws (Figure 2, Sheet 4, Item 97), and nuts (Figure 2, Sheet 4, Item 96).

6. Install connector J30 (Figure 2, Sheet 4, Item 91), four screws (Figure 2, Sheet 4, Item 93), and nuts (Figure 2, Sheet 4, Item 92). Repeat for connector J31 (Figure 2, Sheet 4, Item 94).

7. Install track (Figure 2, Sheet 4, Item 83), three washers (Figure 2, Sheet 4, Item 90), three screws (Figure 2, Sheet 4, Item 89), three nuts (Figure 2, Sheet 4, Item 88), two clips (Figure 2, Sheet 4, Item 87), two insulator blocks (Figure 2, Sheet 4, Item 86), two washers (Figure 2, Sheet 4, Item 85), and two screws (Figure 2, Sheet 4, Item 84).

8. Install socket (Figure 2, Sheet 4, Item 82), relay PAR (Figure 2, Sheet 4, Item 81), and spring (Figure 2, Sheet 4, Item 76).

9. Install socket (Figure 2, Sheet 4, Item 80), relay DBLO (Figure 2, Sheet 4, Item 78), and spring (Figure 2, Sheet 4, Item 76).

10. Install socket (Figure 2, Sheet 4, Item 77), relay KFF (Figure 2, Sheet 4, Item 75), GFR (Figure 2, Sheet 4, Item 74), AR (Figure 2, Sheet 4, Item 73), AFPR (Figure 2, Sheet 4, Item 72), CDR (Figure 2, Sheet 4, Item 71), KR (Figure 2, Sheet 4, Item 70), and spring (Figure 2, Sheet 4, Item 76).

ASSEMBLY - Continued

11. Install screw (Figure 2, Sheet 3, Item 69), nut (Figure 2, Sheet 3, Item 67), two washers (Figure 2, Sheet 3, Item 68), and nut (Figure 2, Sheet 3, Item 67)

12. Install component mounting channel (Figure 2, Sheet 3, Item 63), five washers (Figure 2, Sheet 3, Item 66), lockwashers (Figure 2, Sheet 3, Item 65), and screws (Figure 2, Sheet 3, Item 64).

13. Install screw (Figure 2, Sheet 3, Item 62), nut (Figure 2, Sheet 3, Item 61), loop clamp (Figure 2, Sheet 3, Item 60), and nut (Figure 2, Sheet 3, Item 61).

14. Install lower transformer mounting bracket (Figure 2, Sheet 3, Item 55), two washers (Figure 2, Sheet 3, Item 59), two lockwashers (Figure 2, Sheet 3, Item 58), two screws (Figure 2, Sheet 3, Item 57), and nut (Figure 2, Sheet 3, Item 56).

15. Install upper transformer mounting bracket (Figure 2, Sheet 3, Item 50), two washers (Figure 2, Sheet 3, Item 54), two lockwashers (Figure 2, Sheet 3, Item 53), two screws (Figure 2, Sheet 3, Item 52), and nut (Figure 2, Sheet 3, Item 51).

16. Install AC transformer box A5 (Figure 2, Sheet 3, Item 45), four washers (Figure 2, Sheet 3, Item 49), four lockwashers (Figure 2, Sheet 3, Item 48), four screws (Figure 2, Sheet 3, Item 47), and three fuses (Figure 2, Sheet 3, Item 46). Record barcode values for VA, VB, VC, IA, IB, IC (setpoints AC01 thru AC06) for reprogramming. GSC setpoints must be reprogrammed if AC transformer box A5 is replaced (WP 0081).

17. Install ground fault circuit interrupter GFCI (Figure 2, Sheet 3, Item 42), two screws (Figure 2, Sheet 3, Item 44), and nuts (Figure 2, Sheet 3, Item 43).

18. Install nameplate (Figure 2, Sheet 2, Item 40), (Figure 2, Sheet 2, Item 39), or (Figure 2, Sheet 2, Item 38) and two rivets (Figure 2, Sheet 2, Item 41).

19. Install paralleling receptacle (Figure 2, Sheet 2, Item 34), cover (Figure 2, Sheet 2, Item 37), four screws (Figure 2, Sheet 2, Item 36), and four nuts (Figure 2, Sheet 2, Item 35). Repeat for other paralleling receptacle.

20. Install duplex receptacle (Figure 2, Sheet 2, Item 31), cover (Figure 2, Sheet 2, Item 33), and four screws (Figure 2, Sheet 2, Item 32).

21. Install load sharing module (LSM) A4 (Figure 2, Sheet 2, Item 28), four washers (Figure 2, Sheet 2, Item 30), and screws (Figure 2, Sheet 2, Item 29).

22. Install overload/short circuit relay (Figure 2, Sheet 2, Item 24), four washers (Figure 2, Sheet 2, Item 27), lockwashers (Figure 2, Sheet 2, Item 26), and screws (Figure 2, Sheet 2, Item 25).

23. Install bus transformer box A6 (Figure 2, Sheet 2, Item 19), four washers (Figure 2, Sheet 2, Item 23), four lockwashers (Figure 2, Sheet 2, Item 22), four screws (Figure 2, Sheet 2, Item 21), and two fuses (Figure 2, Sheet 2, Item 20). Record barcode value for VA (setpoint AC07) for reprogramming. GSC setpoints must be reprogrammed if bus transformer box A6 is replaced (WP 0083).

24. Install fuse block (Figure 2, Sheet 2, Item 15), two screws (Figure 2, Sheet 2, Item 18), two nuts (Figure 2, Sheet 2, Item 17), and four fuses (Figure 2, Sheet 2, Item 16).

25. Install fuse block (Figure 2, Sheet 1, Item 11), two screws (Figure 2, Sheet 1, Item 14), two nuts (Figure 2, Sheet 1, Item 13), and three fuses (Figure 2, Sheet 1, Item 12).

ASSEMBLY - Continued

26. On TB4 (Figure 2, Sheet 1, Item 2) only, install two spade terminals (Figure 2, Sheet 1, Item 10), diode (Figure 2, Sheet 1, Item 9), and two screws (Figure 2, Sheet 1, Item 8). Install ten jumpers (Figure 2, Sheet 1, Item 7) and ten screws (Figure 2, Sheet 1, Item 6). Install strip (Figure 2, Sheet 1, Item 5), terminal block TB4 (Figure 2, Sheet 1, Item 2), two screws (Figure 2, Sheet 1, Item 4), and two nuts (Figure 2, Sheet 1, Item 3). Repeat for terminal block TB3.

27. Install three receptacles (Figure 2, Sheet 1, Item 1).

28. Install control box panel assembly (WP 0041).

END OF TASK

INSTALLATION

1. If previously removed, install brace (Figure 1, Item 21) using two screws (Figure 1, Item 18), lockwashers (Figure 1, Item 19), and washers (Figure 1, Item 20).

2. Slide control box (Figure 1, Item 17) fully into generator set.

3. Install seven screws (Figure 1, Item 22), lockwashers (Figure 1, Item 23), and washers (Figure 1, Item 24).

4. Install five screws (Figure 1, Item 14), lockwashers (Figure 1, Item 15), and washers (Figure 1, Item 16).

5. Install two screws (Figure 1, Item 11), lockwashers (Figure 1, Item 12), and washers (Figure 1, Item 13).

6. Install three screws (Figure 1, Item 8), lockwashers (Figure 1, Item 9), and washers (Figure 1, Item 10).

7. Install seven screws (Figure 1, Item 5), lockwashers (Figure 1, Item 6), and washers (Figure 1, Item 7).

8. Install ground wire (Figure 1, Item 1) to back of control box terminal (Figure 1, Item 4) with washer (Figure 1, Item 2) and locknut (Figure 1, Item 3)

9. Remove tag and connect ECM to EMCP harness connector ENG-P37 to control box connector J37.

10. Remove tag and connect harness connector P31 to control box connector J31.

11. Remove tag and connect harness connector P30 to control box connector J30.

12. Install front roof section (WP 0030).

END OF TASK

LSM A4 LOAD GAIN ADJUSTMENT

NOTE

For this procedure the generator set must be running isochronously, not paralleled.

1. Start the generator set and run at full load.
2. Measure the load signal voltage at LSM A4-22 (+) and LSM A4-23 (-).
3. Adjust LSM A4 LOAD GAIN potentiometer for 6.0 Vdc ± 1.0 Vdc.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
RESISTOR ASSEMBLY A7 MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Materials/Parts

Marker tags (WP 0124, Item 49)

Personnel Required

One

References

TM 9-6115-730-24P

Equipment Condition

Resistor assembly A7 removed from control box (WP 0042)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DISASSEMBLY

1. Tag and disconnect wires from resistor assembly A7 components.
2. Remove nut (Figure 1, Item 1), washer (Figure 1, Item 2), and ISOCHRONOUS DROOP switch IDS (Figure 1, Item 3).
3. Remove nut (Figure 1, Item 4), washer (Figure 1, Item 5), and DC CONTROL POWER circuit breaker CB1 (Figure 1, Item 6).
4. Remove six nuts (Figure 1, Item 7), six screws (Figure 1, Item 8), and resistors R1 (Figure 1, Item 9), R2 (Figure 1, Item 10), and R3 (Figure 1, Item 11).

DISASSEMBLY - Continued

5. Remove diode CRFF (Figure 1, Item 12).

6. Remove two nuts (Figure 1, Item 13), two screws (Figure 1, Item 14), and terminal board (Figure 1, Item 15).

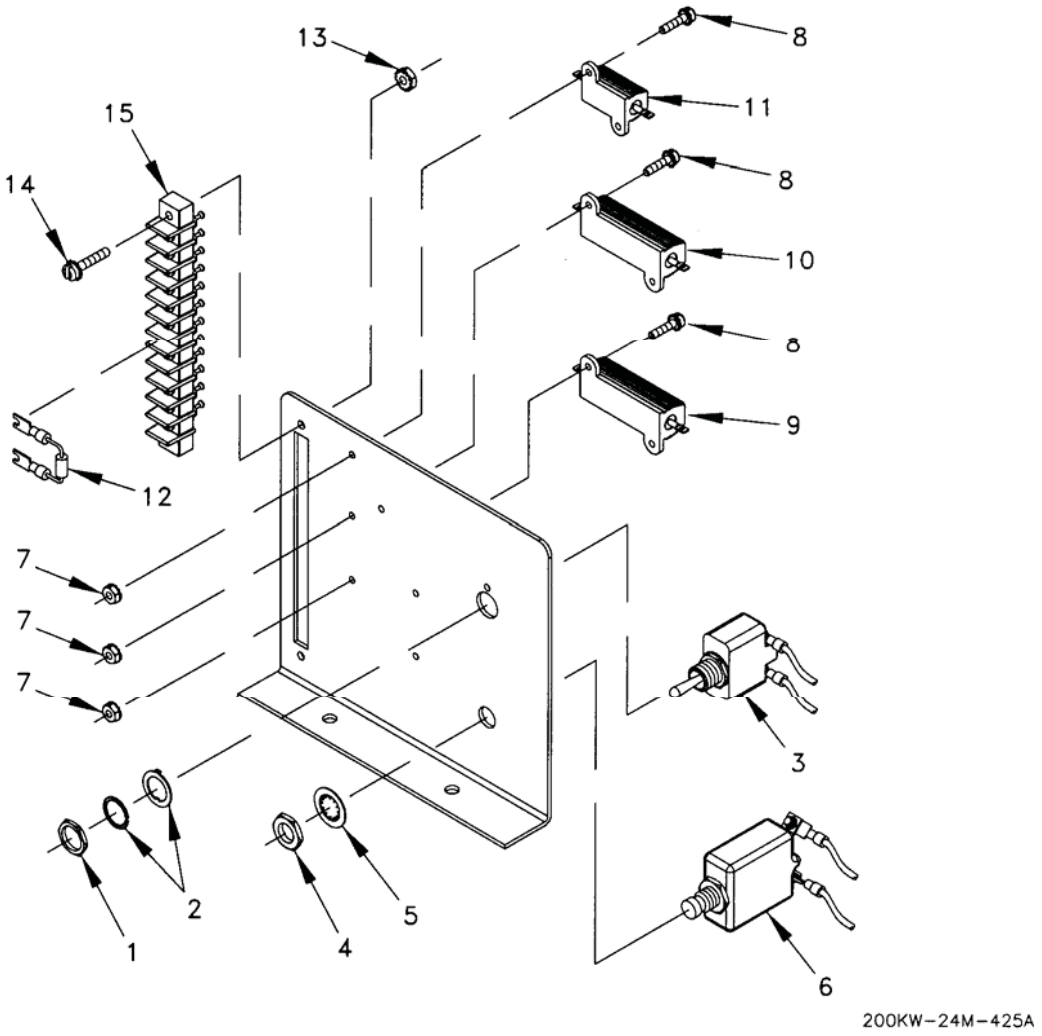

Figure 1. Resistor Assembly A7.

END OF TASK

TEST

1. Using multimeter, measure resistance of the resistors. R1 = 150 ohms +/- 1%, R2 = 10 ohms +/- 1%, and R3 = 15 kohms +/–1%.
2. Using multimeter, check forward and reverse bias on diode CRFF.
3. Replace any components that fail a measurement test.

END OF TASK

ASSEMBLY

1. Install terminal board (Figure 1, Item 15), two screws (Figure 1, Item 14), and two nuts (Figure 1, Item 13).
2. Install diode CRFF (Figure 1, Item 12).
3. Install resistors R3 (Figure 1, Item 11), R2 (Figure 1, Item 10), and R1 (Figure 1, Item 9), with six screws (Figure 1, Item 8) and nuts (Figure 1, Item 7).
4. Install DC CONTROL POWER circuit breaker CB1 (Figure 1, Item 6), washer (Figure 1, Item 5), and nut (Figure 1, Item 4).
5. Install ISOCHRONOUS DROOP switch IDS (Figure 1, Item 3), washer (Figure 1, Item 2), and nut (Figure 1, Item 1).
6. Install resistor assembly A7 (WP 0042).
7. Remove tags and connect wires to resistor assembly A7 components.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
CONTROL BOX HARNESS ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Materials/Parts

Marker tags (WP 0124, Item 49)

Personnel Required

One

References

WP 0088
FO-4
TM 55-1500-323-24
TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Open battery access doors, left front door, left rear doors, load board door, right front doors, right rear doors, and generator access cover assembly.

3. Using Control Panel Harness Wire List (WP 0088), and Control Box Wiring Diagram, FO-4 as guides, tag and disconnect control box harness assembly.

END OF TASK

REPAIR OR REPLACEMENT

Repair as required using components identified in Control Panel Harness Wire List and general procedures identified in Installation Practices for Aircraft Electrical and Electronic Wiring, TM 55-1500-323-24.

END OF TASK

INSTALLATION

1. Using Control Panel Harness Wire List (WP 0088) and Control Box Wiring Diagram, FO-4 as guides, remove tags and connect control box harness assembly.

2. Close generator access cover assembly, left front door, right rear doors, right front doors, load board door assembly, left rear doors, and battery access doors.

3. Verify the generator set operates properly.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

RECONNECTION TERMINAL BOARD ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Personnel Required

One

Materials/Parts

Tiedown straps (WP 0124, Item 47)

References

WP 0083
TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

DISASSEMBLY

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Open right rear doors.

3. Remove four locknuts (Figure 1, Item 1), four washers (Figure 1, Item 2), and protective cover (Figure 1, Item 3).

4. Remove two screws (Figure 1, Item 4) and four standoffs (Figure 1, Item 5) and pull reconnection terminal board assembly (Figure 1, Item 6) away from its lower mounting and two standoffs (Figure 1, Item 7).

DISASSEMBLY - Continued

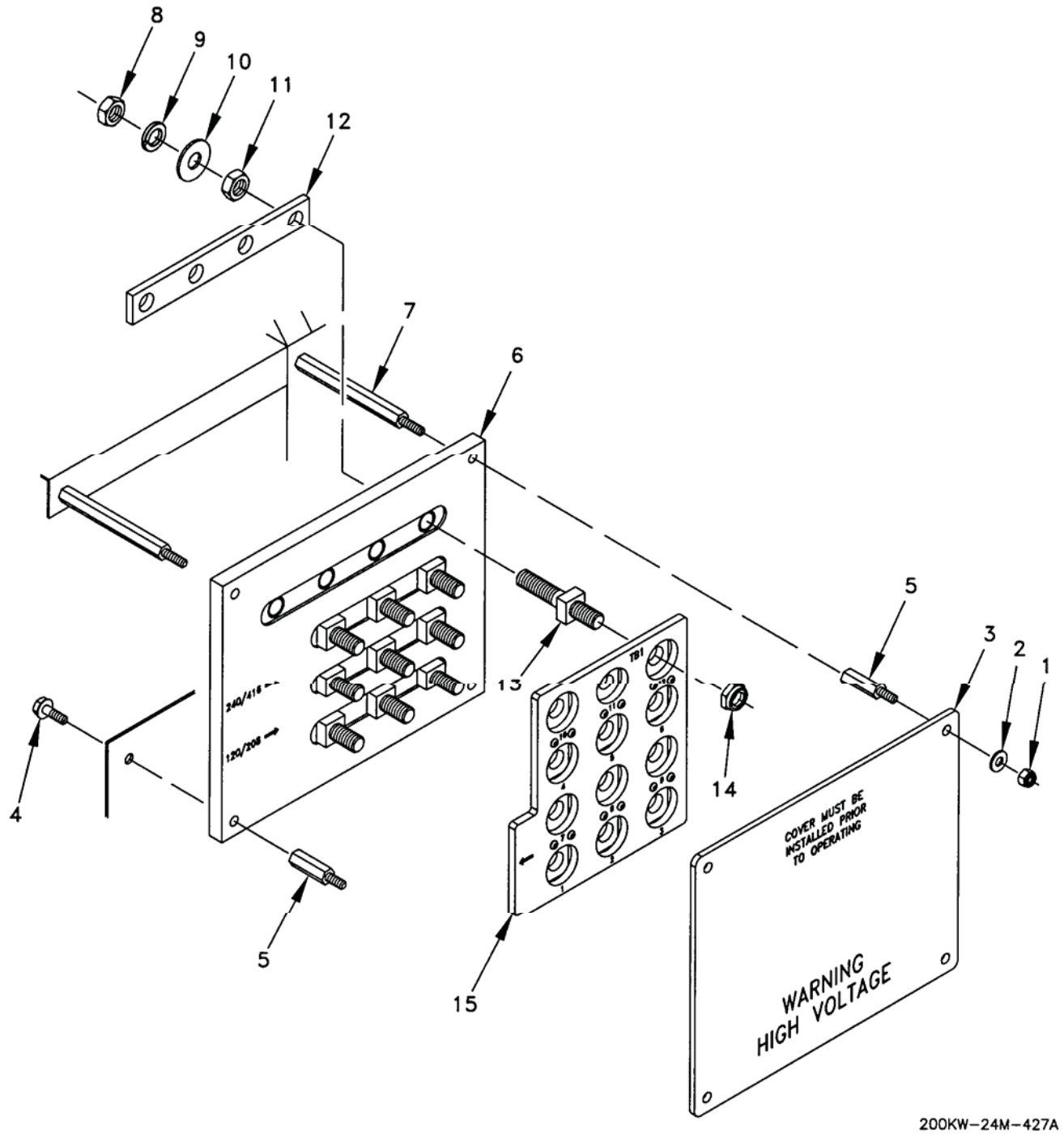

Figure 1. Reconnection Terminal Board Assembly.

DISASSEMBLY - Continued

NOTE

Cut tiedown straps as required.

5. Remove 13 jam nuts (Figure 1, Item 8), lockwashers (Figure 1, Item 9), and washers (Figure 1, Item 10), and tag and disconnect wires from rear of reconnection terminal board assembly (Figure 1, Item 6).

6. Remove 13 jam nuts (Figure 1, Item 11), bus bar (Figure 1, Item 12), 13 studs (Figure 1, Item 13), 13 locknuts (Figure 1, Item 14), and moveable terminal board (Figure 1, Item 15).

END OF TASK

ASSEMBLY

1. Install moveable terminal board (Figure 1, Item 15) on terminal board assembly (Figure 1, Item 6), and secure with 13 locknuts (Figure 1, Item 14), 13 studs (Figure 1, Item 13), bus bar (Figure 1, Item 12), and 13 jam nuts (Figure 1, Item 11). Torque locknuts (Figure 1, Item 14) to 20 lb-ft (27 Nm). Torque jam nuts (Figure 1, Item 11) to 30 lb-ft (41 Nm).

2. Remove tags and connect wires to rear of reconnection terminal board assembly (Figure 1, Item 6), and secure with 13 washers (Figure 1, Item 10), lockwashers (Figure 1, Item 9) and jam nuts (Figure 1, Item 8). Torque jam nuts (Figure 1, Item 8) to 30 lb-ft (41 Nm).

NOTE

Install tiedown straps as required.

3. Position reconnection terminal board assembly (Figure 1, Item 6) on its lower mounting and two standoffs (Figure 1, Item 7), and secure with four standoffs (Figure 1, Item 5) and two screws (Figure 1, Item 4).

4. Install protective cover (Figure 1, Item 3) and secure with four washers (Figure 1, Item 2) and locknuts (Figure 1, Item 1).

5. Close right rear doors.

6. If required, reprogram GSC and DVR parameters per WP 0083.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
LOAD TERMINAL BOARD ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Materials/Parts

Marker tags (WP 0124, Item 49)
Tiedown straps (WP 0124, Item 48)

Personnel Required

One

References

TM 9-6115-730-24P

Equipment Condition

Load board door removed (WP 0024)
Door support assembly removed (WP 0040)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

DISASSEMBLY

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

NOTE

Cut tiedown straps as required.

2. Tag and disconnect load cables, if necessary, from front of load board (Figure 1, Sheet 1, Item 1) and pull cables through opening at rear of generator set.

DISASSEMBLY - Continued

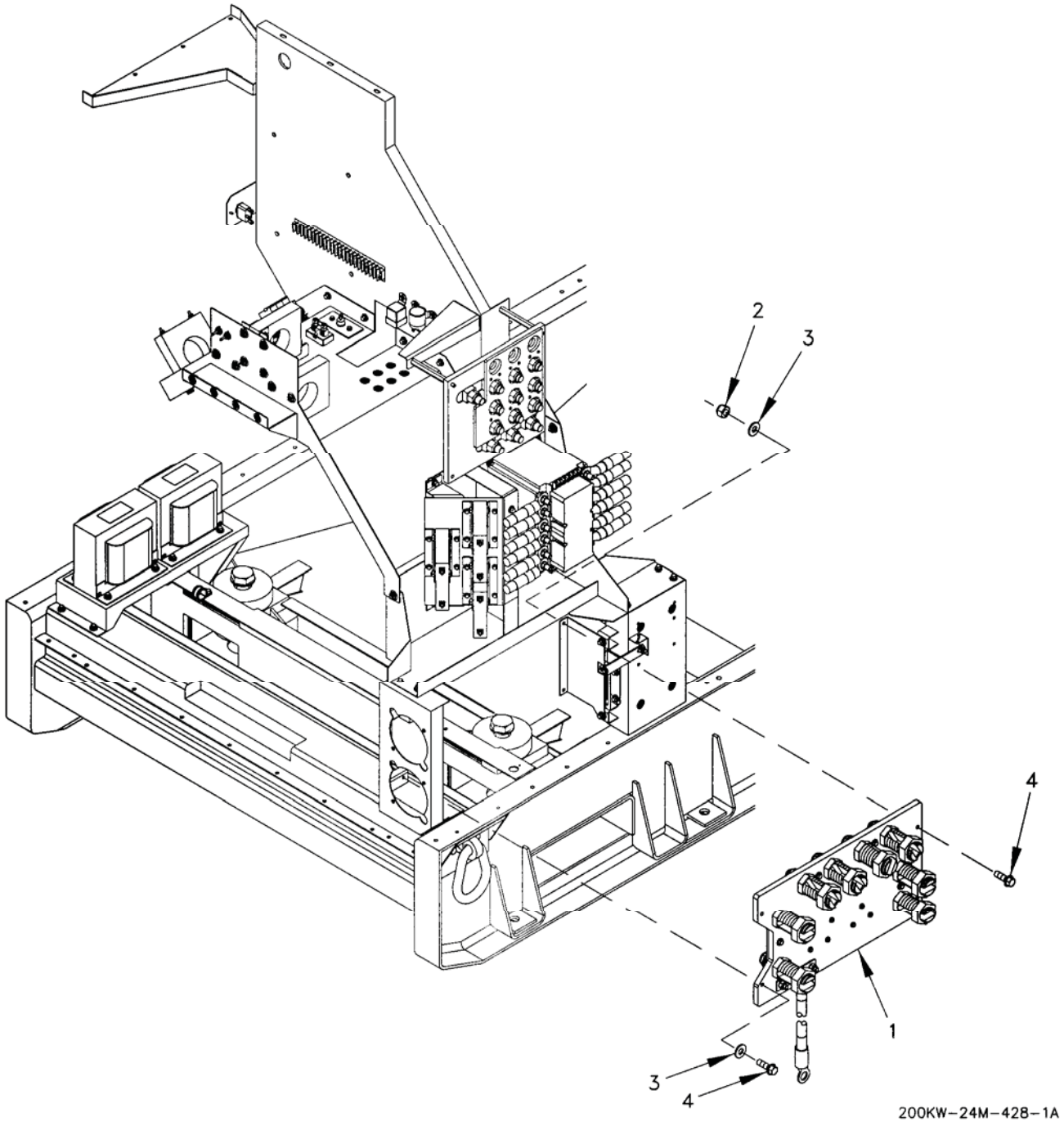

Figure 1. Load Terminal Board Assembly (Sheet 1 of 2).

DISASSEMBLY - Continued

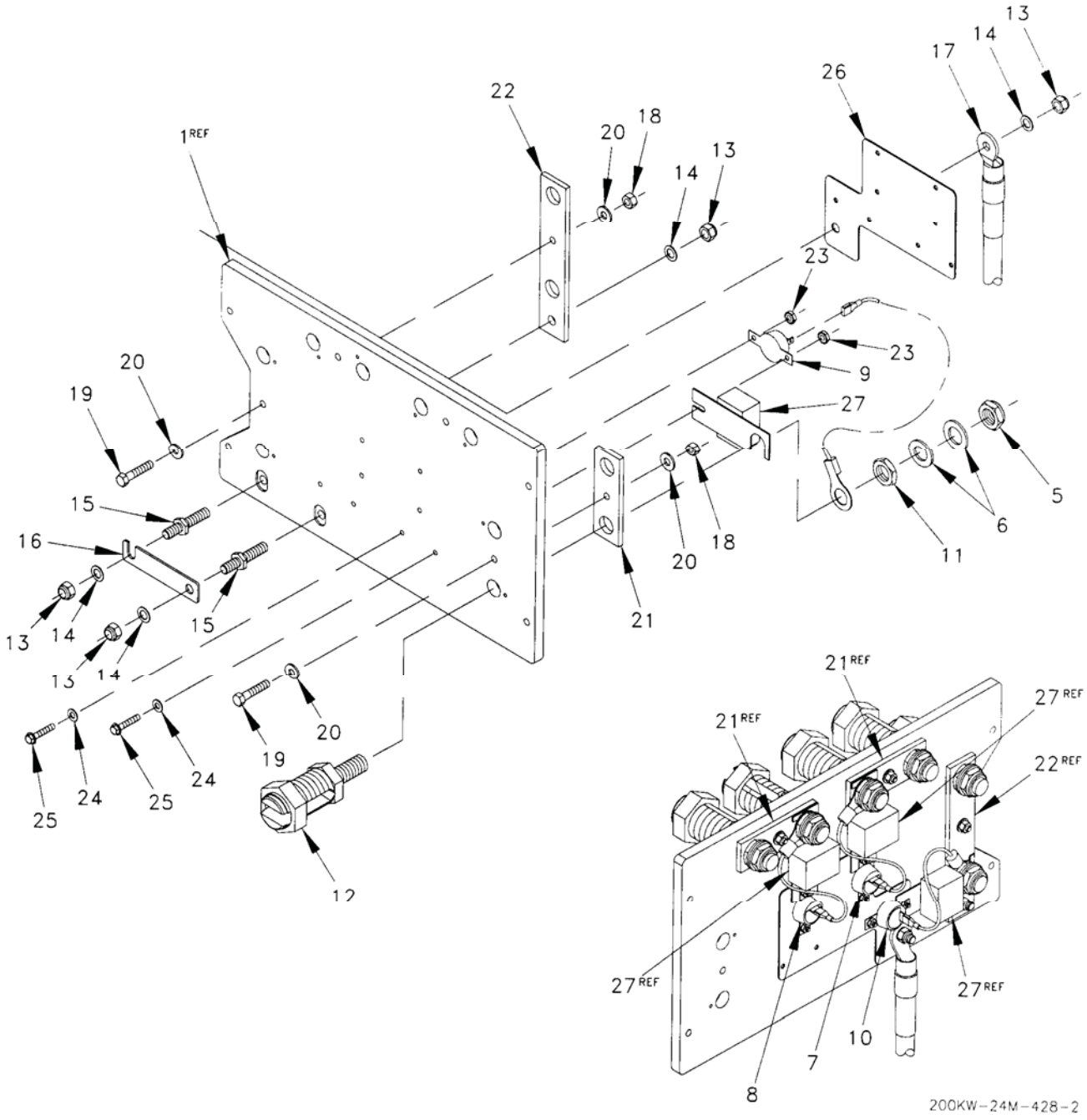

Figure 1. Load Terminal Board Assembly (Sheet 2 of 2).

DISASSEMBLY - Continued

3. Remove two locknuts (Figure 1, Sheet 1, Item 2), six washers (Figure 1, Sheet 1, Item 3), four screws (Figure 1, Sheet 1, Item 4), and turn load board (Figure 1, Sheet 1, Item 1) partly over.

4. Remove eight locknuts (Figure 1, Sheet 2, Item 5) and 16 washers (Figure 1, Sheet 2, Item 6), and tag and disconnect wires from the rear of load board (Figure 1,sheet 2, Item6).

5. Tag and disconnect wires from rear of load board (Figure 1, Sheet 2, Item 12) terminals.

6. Tag wires from four varistors, V1 (Figure 1, Sheet 2, Item 7), V2 (Figure 1, Sheet 2, Item 8), V3 (Figure 1, Sheet 2, Item 9), and V4 (Figure 1, Sheet 2, Item 10).

7. Remove eight jam nuts (Figure 1, Sheet 2, Item 11) and load terminals (Figure 1, Sheet 2, Item 12).

8. Remove four locknuts (Figure 1, Sheet 2, Item 13), four washers (Figure 1, Sheet 2, Item 14), two studs (Figure 1, Sheet 2, Item 15), bus bar (Figure 1, Sheet 2, Item 16), and ground wire (Figure 1, Sheet 2, Item 17).

9. Remove four locknuts (Figure 1, Sheet 2, Item 18), four screws (Figure 1, Sheet 2, Item 19), eight washers (Figure 1, Sheet 2, Item 20), three bus bars (Figure 1, Sheet 2, Item 21), and bus bar (Figure 1, Sheet 2, Item 22).

CAUTION

Note orientation of EMI filters (Figure 1, Sheet 2, Item 22) before removing.

10. Remove eight nuts (Figure 1, Sheet 2, Item 23), washers (Figure 1, Sheet 2, Item 24), screws (Figure 1, Sheet 2, Item 25), varistors V1 (Figure 1, Sheet 2, Item 7), V2 (Figure 1, Sheet 2, Item 8), V3 (Figure 1, Sheet 2, Item 9), and V4 (Figure 1, Sheet 2, Item 10), ground plate (Figure 1, Sheet 2, Item 26), and four EMI filter assemblies (Figure 1, Sheet 2, Item 27).

END OF TASK

ASSEMBLY

CAUTION

Note orientation of EMI filters (Figure 1, Sheet 2, Item 22) before installing.

1. Install four EMI filter assemblies (Figure 1, Sheet 2, Item 27), ground plate (Figure 1, Sheet 2, Item 26), varistors V4 (Figure 1, Sheet 2, Item 10), V3 (Figure 1, Sheet 2, Item 9), V2 (Figure 1, Sheet 2, Item 8), and V1 (Figure 1, Sheet 2, Item 7), eight screws (Figure 1, Sheet 2, Item 25), washers (Figure 1, Sheet 2, Item 24), and nuts (Figure 1, Sheet 2, Item 23).

2. Install bus bar (Figure 1, Sheet 2, Item 22), three bus bars (Figure 1, Sheet 2, Item 21), eight washers (Figure 1, Sheet 2, Item 20), four screws (Figure 1, Sheet 2, Item 19), and four locknuts (Figure 1, Sheet 2, Item 18).

3. Install bus bar (Figure 1, Sheet 2, Item 16), two studs (Figure 1, Sheet 2, Item 15), four washers (Figure 1, Sheet 2, Item 14), ground wire (Figure 1, Sheet 2, Item 17), and four locknuts (Figure 1, Sheet 2, Item 13).

4. Install eight load terminals (Figure 1, Sheet 2, Item 12), and jam nuts (Figure 1, Sheet 2, Item 11).

ASSEMBLY - Continued

NOTE

Install tiedown straps as required.

5. Connect wires from four varistors V4 (Figure 1, Sheet 2, Item 10), V3 (Figure 1, Sheet 2, Item 9), V2 (Figure 1, Sheet 2, Item 8), and V1 (Figure 1, Sheet 2, Item 7), and install eight washers (Figure 1, Sheet 2, Item 6) and eight locknuts (Figure 1, Sheet 2, Item 5).

6. Position load board (Figure 1, Sheet 1, Item 1) and install four screws (Figure 1, Sheet 1, Item 4), washers (Figure 1, Sheet 1, Item 3), and two locknuts (Figure 1, Sheet 1, Item 2).

7. Install load board door (WP 0024) and door support assembly (WP 0040) as necessary.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

BATTERY CABLE ASSEMBLIES MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic s (WP 0123, Item 1)

Personnel Required

One

Materials/Parts

Tiedown straps (WP 0124, Item 48)

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

When disconnecting or removing batteries, disconnect the negative lead that connects directly to the grounding stud first. Disconnect the negative end of the interconnection cable next. When installing batteries, reverse the connection sequence. Failure to comply can cause serious injury to personnel.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.
2. Ensure there is no external cable connected to slave receptacle.
3. Open battery access doors.

REMOVAL - Continued

NOTE

When looking into battery compartment, batteries are identified from left to right as BT4, BT2, BT1, and BT3.

Tiedown straps should be cut as required.

4. Tag cables and remove battery terminal knob (Figure 1, Sheet 1, Item 3), lock washer (Figure 1, Sheet 1, Item 3A), and flat washer (Figure 1, Sheet 1, Item 3B) that secure battery cable 1B40 (Figure 1, Sheet 1, Item 1) and battery cable 1A40 (Figure 1, Sheet 1, Item 2) to battery BT2 negative terminal. Remove battery cables 1A40 and 1B40.

5. Tag cables and remove battery terminal knob (Figure 1, Sheet 1, Item 5), lock washer (Figure 1, Sheet 1, Item 5A), and flat washer (Figure 1, Sheet 1, Item 5B) that secure battery cable 1D40 (Figure 1, Sheet 1, Item 4) and battery cable 1B40 (Figure 1, Sheet 1, Item 1) to battery BT4 negative terminal. Remove battery cables 1B40 and 1D40.

6. Tag cable and remove battery terminal knob (Figure 1, Sheet 1, Item 8), lock washer (Figure 1, Sheet 1, Item 8A), and flat washer (Figure 1, Sheet 1, Item 8B) and battery terminal knob (Figure 1, Sheet 1, Item 9), lock washer (Figure 1, Sheet 1, Item 9A), and flat washer (Figure 1, Sheet 1, Item 9B) that secure battery cable 12B40 (Figure 1, Sheet 1, Item 6) and battery cable 12A40 (Figure 1, Sheet 1, Item 7) to battery BT1 negative terminal and battery BT3 negative terminal. Remove battery cable 12B40.

7. Tag cable and remove battery terminal knob (Figure 1, Sheet 1, Item 11), lock washer (Figure 1, Sheet 1, Item 11A), and flat washer (Figure 1, Sheet 1, Item 11B) that secure battery cable 12A40 (Figure 1, Sheet 1, Item 7) and battery cable 12C40 (Figure 1, Sheet 1, Item 10) to battery BT2 positive terminal. Remove battery cable 12A40.

8. Tag cable and remove battery terminal knob (Figure 1, Sheet 1, Item 12), lock washer (Figure 1, Sheet 1, Item 12A), and flat washer (Figure 1, Sheet 1, Item 12B) that secure battery cable 12C40 (Figure 1, Sheet 1, Item 10) to battery BT4 positive terminal. Remove battery cable 12C40.

9. Tag cable and remove battery terminal knob (Figure 1, Sheet 1, Item 15), lock washer (Figure 1, Sheet 1, Item 15A), and flat washer (Figure 1, Sheet 1, Item 15B) that secure battery cable 24A40 (Figure 1, Sheet 1, Item 14) to battery BT1 positive terminal.

10. Tag cable and remove battery terminal knob (Figure 1, Sheet 1, Item 17), lock washer (Figure 1, Sheet 1, Item 17A), and flat washer (Figure 1, Sheet 1, Item 17B) that secure battery cable 24B40 (Figure 1, Sheet 1, Item 13) and battery cable 24H40 (Figure 1, Sheet 1, Item 16) to battery BT3 positive terminal. Remove battery cable 24B40.

11. Remove four nuts (Figure 1, Item 18), screws (Figure 1, Sheet 1, Item 19), and washers (Figure 1, Sheet 1, Item 20), and push slave receptacle SR (Figure 1, Sheet 1, Item 21) out of TQG.

12. Remove slave receptacle SR (Figure 1, Sheet 1, Item 18) (WP 0054). Disconnect battery cable 1D40 (Figure 1, Sheet 1, Item 4) and battery cable 24H40 (Figure 1, Sheet 1, Item 16) from slave receptacle SR (Figure 1, Sheet 1, Item 21) and remove battery cables 1D40 and 24H40.

13. Remove four screws (Figure 1, Item 24), lockwashers (Figure 1, Item 25), and washers (Figure 1, Item 26), and pull battery disconnect switch (BDS) (Figure 1, Item 23) away from wall.

14. At rear of BDS (Figure 1, Item 23), tag and disconnect battery cables 1A40 (Figure 1, Item 2) and 2A40 (Figure 1, Item 22).

15. Remove battery disconnect switch (Figure 1, Item 23). Tag and disconnect sensor cables from BDS.

16. Disconnect battery cable 1A40 (Figure 1, Sheet 1, Item 2) and battery cable 2A40 (Figure 1, Sheet 1, Item 22) from BDS (Figure 1, Sheet 1, Item 23) and remove battery cable 1A40.

17. Disconnect battery cable 24A40 (Figure 1, Sheet 1, Item 14) from starter solenoid (Figure 1, Sheet 1, Item 27).

REMOVAL - Continued

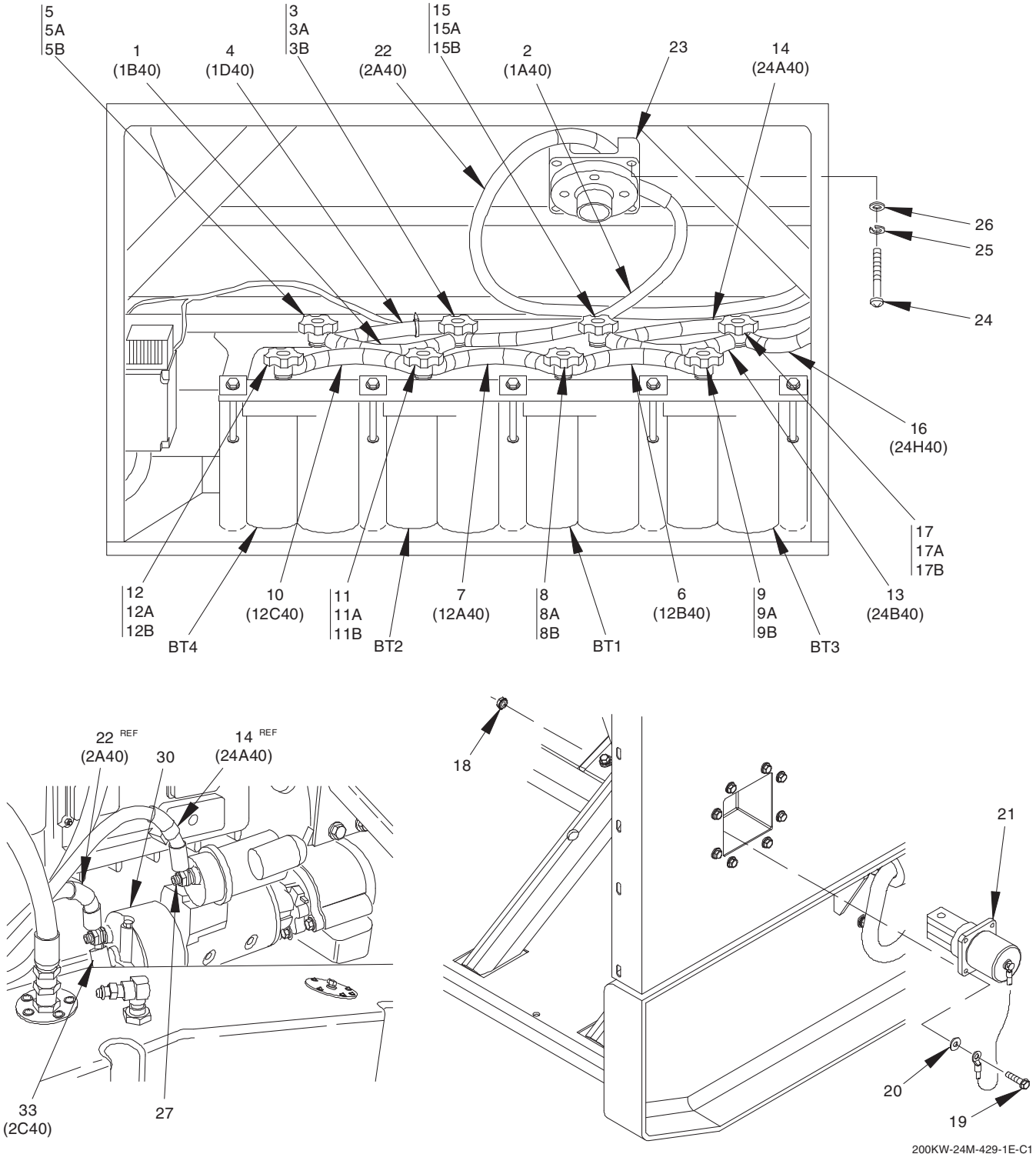

Figure 1. Battery Cable Assemblies (Sheet 1 of 2).

REMOVAL - Continued

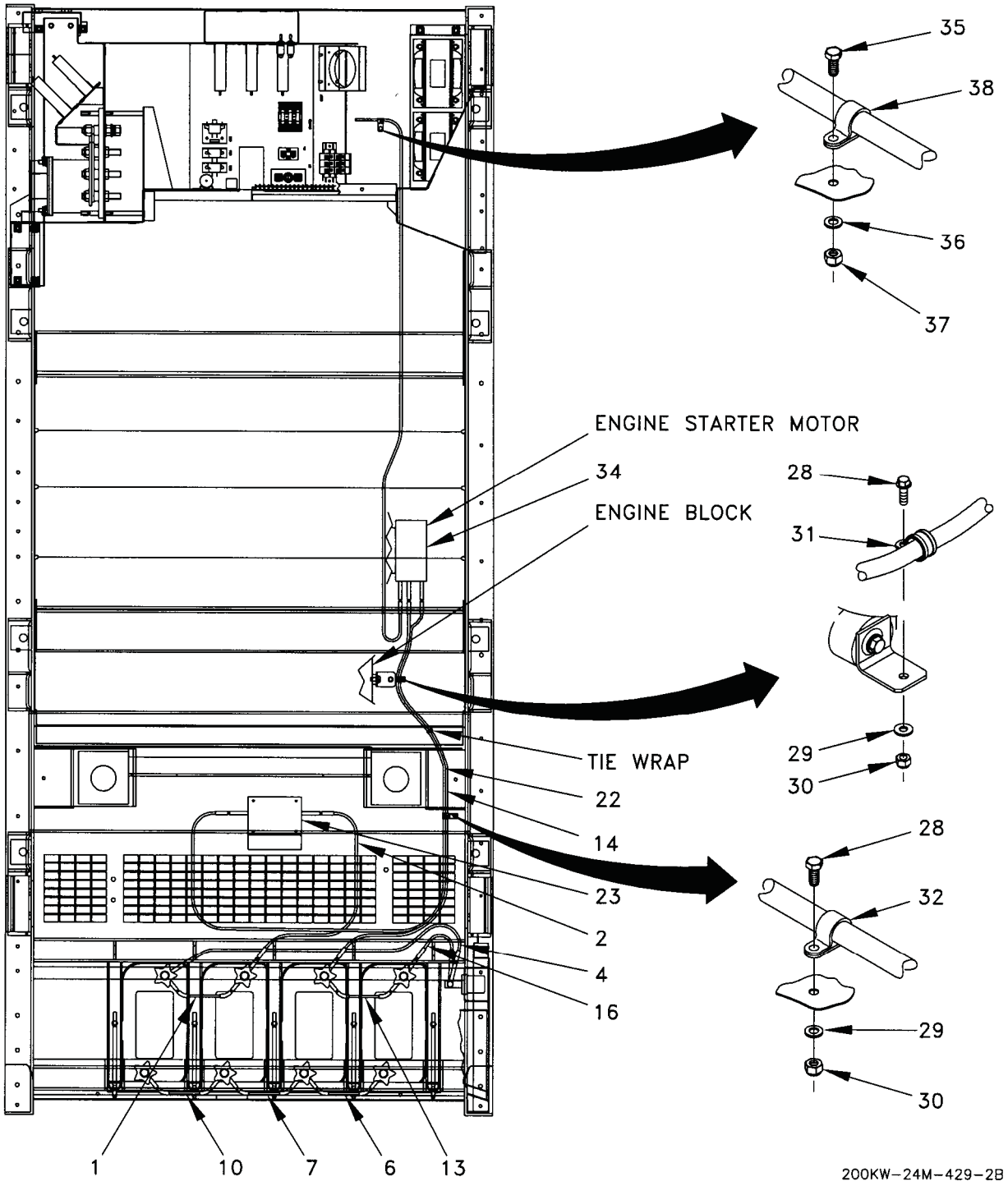

Figure 1. Battery Cable Assemblies (Sheet 2 of 2).

REMOVAL - Continued

18. Remove two screws (Figure 1, Sheet 2, Item 28), washers (Figure 1, Sheet 2, Item 29), locknuts (Figure 1, Sheet 2, Item 30), and clamps (Figure 1, Sheet 2, Item 31) and (Figure 1, Sheet 2, Item 32). Remove battery cable 24A40 (Figure 1, Sheet 2, Item 14).

19. Disconnect battery cable 2A40 from upper portion of starter (Figure 1, Sheet 2, Item 22) (Figure 1, Sheet 2, Item 34) and battery cable 2C40 from lower portion of starter (Figure 1, Sheet 1, Item 33) (Figure 1, Sheet 2, Item 34).

20. Disconnect battery cable 2C40 (Figure 1, Sheet 1, Item 33) from load terminal board GND terminal (WP 0046).

21. Removed screw (Figure 1, Sheet 2, Item 35), washer (Figure 1, Sheet 2, Item 36), locknut (Figure 1, Sheet 2, Item 37), and clamp (Figure 1, Sheet 2, Item 38). Remove battery cable 2C40 (Figure 1, Sheet 1, Item 33).

END OF TASK

INSTALLATION

NOTE

Install tiedown straps as required.

1. Install battery cable 2C40 (Figure 1, Sheet 1, Item 33) and secure with screw (Figure 1, Sheet 2, Item 35), washer (Figure 1, Sheet 2, Item 36), clamp (Figure 1, Sheet 2, Item 38), and locknut (Figure 1, Sheet 2, Item 37).

2. Connect battery cable 2C40 (Figure 1, Sheet 1, Item 33) to load terminal board terminal GND (WP 0046).

3. Install battery cable 2A40 (Figure 1, Sheet 2, Item 22) and connect battery cable 2A40 (Figure 1, Sheet 2, Item 22) and battery cable 2C40 (Figure 1, Sheet 1, Item 30) to starter (Figure 1, Sheet 2, Item 34).

4. Install battery cable 24A40 (Figure 1, Sheet 2, Item 14), with two screws (Figure 1, Sheet 2, Item 28), washer (Figure 1, Sheet 2, Item 29), locknut (Figure 1, Sheet 2, Item 30), and clamps (Figure 1, Sheet 2, Item 31) and (Figure 1, Sheet 2, Item 32).

5. Connect battery cable 24A40 (Figure 1, Sheet 2, Item 14) to starter solenoid (Figure 1, Sheet 1, Item 27).

6. Position battery disconnect switch (Figure 1, Item 23) near where it is to be installed. Remove tags and connect battery cable 2A40 (Figure 1, Item 22) and sensor cable 1A40 (Figure 1, Item 2).

7. Install battery disconnect switch (Figure 1, Item 23) with four washers (Figure 1, Item 26), lockwashers (Figure 1, Item 25), and screws (Figure 1, Item 24).

8. Install battery cables 1D40 (Figure 1, Sheet 1, Item 4) and 24H40 (Figure 1, Sheet 1, Item 16) and connect to slave receptacle SR (Figure 1, Sheet 1, Item 21).

9. Push slave receptacle SR (Figure 1, Sheet 1, Item 21) into TQG and install four washers (Figure 1, Sheet 1, Item 20), screws (Figure 1, Sheet 1, Item 19), and nuts (Figure 1, Sheet 1, Item 18).

10. Install battery cable 24H40 (Figure 1, Sheet 1, Item 16) and battery cable 24B40 (Figure 1, Sheet 1, Item 13) on battery BT3 positive terminal and secure with flat washer (Figure 1, Sheet 1, Item 17B), lock washer (Figure 1, Sheet 1, Item 17A), and battery terminal knob (Figure 1, Sheet 1, Item 17). Remove tags from battery cables.

INSTALLATION - Continued

11. Install battery cable 24A40 (Figure 1, Sheet 1, Item 14) on battery BT1 positive terminal and secure with flat washer (Figure 1, Sheet 1, Item 15B), lock washer (Figure 1, Sheet 1, Item 15A), and battery terminal knob (Figure 1, Sheet 1, Item 15). Remove tag from battery cable.

12. Install battery cable 12C40 (Figure 1, Sheet 1, Item 10) on battery BT4 positive terminal and secure with flat washer (Figure 1, Sheet 1, Item 12B), lock washer (Figure 1, Sheet 1, Item 12A), and battery terminal knob (Figure 1, Sheet 1, Item 12). Remove tag from battery cable.

13. Install battery cable 12C40 (Figure 1, Sheet 1, Item 10) and battery cable 12A40 (Figure 1, Sheet 1, Item 7) on battery BT2 positive terminal and secure with flat washer (Figure 1, Sheet 1, Item 11B), lock washer (Figure 1, Sheet 1, Item 11A), and battery terminal knob (Figure 1, Sheet 1, Item 11). Remove tags from battery cables.

14. Install battery cable 12B40 (Figure 1, Sheet 1, Item 6) on battery BT3 negative terminal and secure with flat washer (Figure 1, Sheet 1, Item 9B), lock washer (Figure 1, Sheet 1, Item 9A), and battery terminal knob (Figure 1, Sheet 1, Item 9). Remove tag from battery cable.

15. Install battery cable 12A40 (Figure 1, Sheet 1, Item 7) and battery cable 12B40 (Figure 1, Sheet 1, Item 6) on battery BT1 negative terminal and battery BT3 negative terminal and secure with flat washer (Figure 1, Sheet 1, Item 8B), lock washer (Figure 1, Sheet 1, Item 8A), and battery terminal knob (Figure 1, Sheet 1, Item 8). Remove tag from battery cable.

16. Install battery cable 1B40 (Figure 1, Sheet 1, Item 1) and battery cable 1D40 (Figure 1, Sheet 1, Item 4) on battery BT4 negative terminal and secure with flat washer (Figure 1, Sheet 1, Item 5B), lock washer (Figure 1, Sheet 1, Item 5A), and battery terminal knob (Figure 1, Sheet 1, Item 5). Remove tags from battery cables.

17. Install battery cable 1B40 (Figure 1, Sheet 1, Item 1) and battery cable 1A40 (Figure 1, Sheet 1, Item 2) on battery BT2 negative terminal and secure with flat washer (Figure 1, Sheet 1, Item 3B), lock washer (Figure 1, Sheet 1, Item 3A), and battery terminal knob (Figure 1, Sheet 1, Item 3). Remove tags from battery cables.

18. Close battery access doors.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
POWER CABLE ASSEMBLIES MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Materials/Parts

Marker tags (WP 0124, Item 49)
Tiedown straps (WP 0124, Item 48)

Personnel Required

One

References

TM 9-6115-730-24P

Equipment Condition

Load terminal board partially removed (WP 0046)
Reconnection terminal board partially removed (WP 0045)
Front plates removed from main load contactor (WP 0049)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Open right rear doors. Open load board door.

REMOVAL - Continued

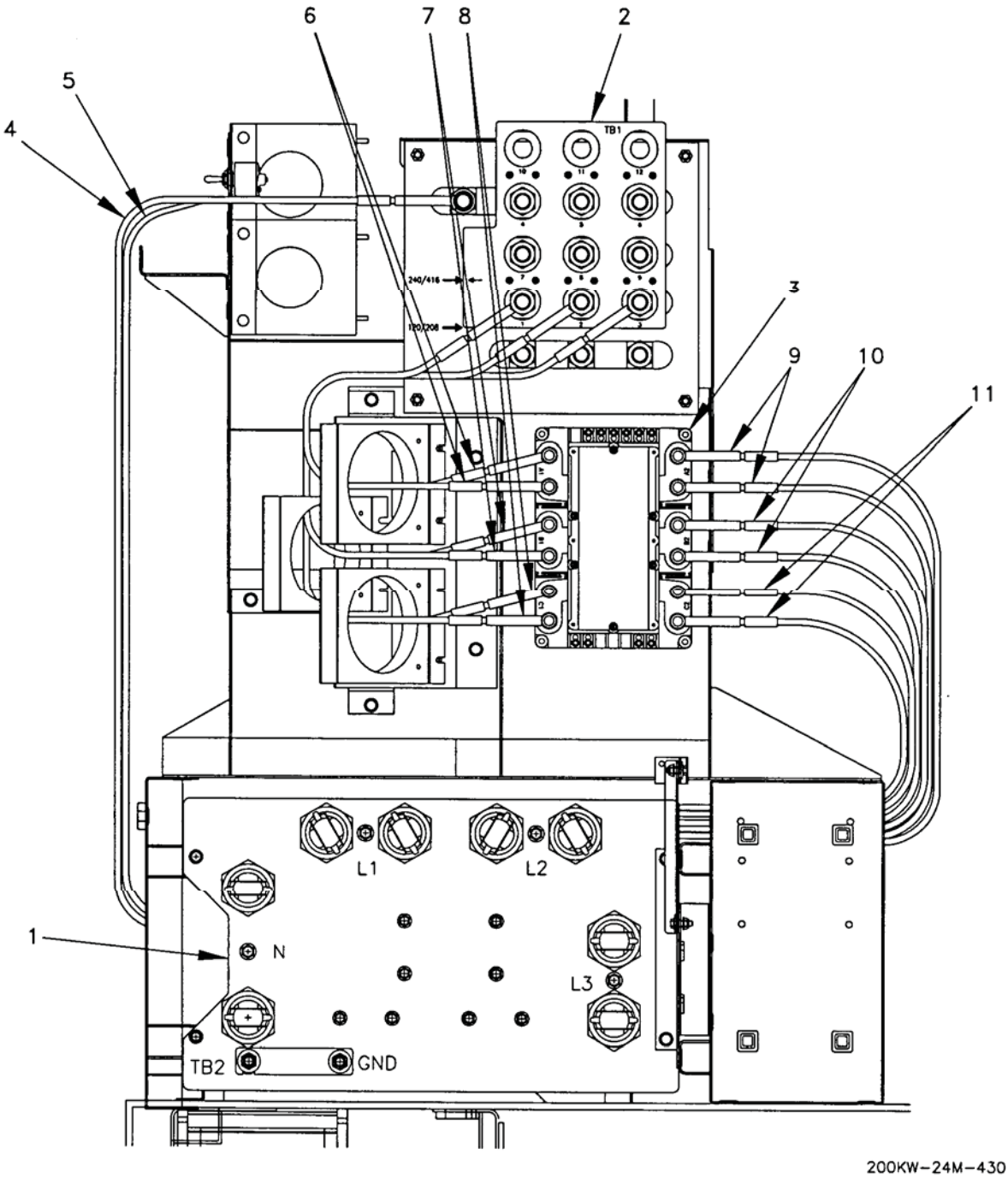

Figure 1. Power Cable Assemblies.

REMOVAL - Continued

NOTE

Cut tiedown straps as required.

3. Partly remove load terminal board assembly (Figure 1, Item 1) (WP 0046) sufficiently to gain access to rear of load terminal board assembly.

4. Partly remove reconnection terminal board (Figure 1, Item 2) (WP 0045) sufficiently to gain access to rear of reconnection terminal board.

5. Remove two plates from front of main load contactor (Figure 1, Item 3) (WP 0049) to gain access to cable terminals on front of main load contactor.

6. Tag and disconnect cable 110K (Figure 1, Item 4) from terminal 10 on reconnection terminal board (Figure 1, Item 2) and terminal N on load terminal board assembly (Figure 1, Item 1).

7. Tag and disconnect cable 110L (Figure 1, Item 5) from terminal 12 on reconnection terminal board (Figure 1, Item 2) and terminal N on load terminal board assembly (Figure 1, Item 1).

NOTE

Except for cables 110K and 110L, all power cables are installed in pairs.

8. Tag and disconnect cables 101A and 101B (Figure 1, Item 6) from terminal 1 on reconnection terminal board (Figure 1, Item 2) and from two terminals A1 on main load contactor (Figure 1, Item 3).

9. Tag and disconnect cables 102A and 102B (Figure 1, Item 7) from terminal 2 of reconnection terminal board (Figure 1, Item 2) and from two terminals B1 on main load contactor (Figure 1, Item 3).

10. Tag and disconnect cables 103A and 103B (Figure 1, Item 8) from terminal 3 on reconnection terminal board (Figure 1, Item 2) and from two terminals C1 on main load contactor (Figure 1, Item 3).

11. Tag and disconnect cables 121A and 121B (Figure 1, Item 9) from two terminals A2 on main load contactor (Figure 1, Item 3) and from two terminals L1 on load terminal board (Figure 1, Item 1).

12. Tag and disconnect cables 122A and 122B (Figure 1, Item 10) from two terminals B2 on main load contactor (Figure 1, Item 3) and from two terminals L2 on load terminal board (Figure 1, Item 1).

13. Tag and disconnect cables 123A and 123B (Figure 1, Item 11) from two terminals C2 on main load contactor (Figure 1, Item 3) and from two terminals L3 on load terminal board (Figure 1, Item 1).

END OF TASK

INSTALLATION

NOTE

Install tiedown straps as required.

1. Remove tags and connect cables 123A and 123B (Figure 1, Item 11) to two terminals L3 on load terminal board (Figure 1, Item 1) and to two terminals C2 on main load contactor (Figure 1, Item 3).

INSTALLATION - Continued

2. Remove tags and connect cables 122A and 122B (Figure 1, Item 10) to two terminals L2 on load terminal board (Figure 1, Item 1) and to two terminals B2 on main load contactor (Figure 1, Item 3).

3. Remove tags and connect cables 121A and 121B (Figure 1, Item 9) to two terminals L1 on load terminal board (Figure 1, Item 1) and to two terminals A2 on main load contactor (Figure 1, Item 3).

4. Remove tags and connect cables 103A and 103B (Figure 1, Item 8) to two terminals C1 on main load contactor (Figure 1, Item 3) and to two terminals 3 on reconnection terminal board (Figure 1, Item 2).

5. Remove tags and connect cables 102A and 102B (Figure 1, Item 7) to two terminals B1 on main load contactor (Figure 1, Item 3) and to two terminals 2 on reconnection terminal board (Figure 1, Item 2).

6. Remove tags and connect cables 101A and 101B (Figure 1, Item 6) to two terminals A1 on main load contactor (Figure 1, Item 3) and to two terminals 1 on reconnection terminal board (Figure 1, Item 2).

7. Remove tags and connect cable 110L (Figure 1, Item 5) to terminal N on load terminal board (Figure 1, Item 1) and to terminal 12 on reconnection terminal board (Figure 1, Item 2).

8. Remove tags and connect cable 110K (Figure 1, Item 4) to terminal N on load terminal board (Figure 1, Item 1) and to terminal 10 on reconnection terminal board (Figure 1, Item 2).

9. Install plate on front of main load contactor (Figure 1, Item 3) (WP 0049).

10. Install reconnection terminal board (Figure 1, Item 2) (WP 0045).

11. Install load terminal board (Figure 1, Item 1) (WP 0046).

12. Close load board door. Close right rear doors.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
MAIN LOAD CONTACTOR MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Personnel Required

One

Materials/Parts

Marker tags (WP 0124, Item 49)

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.
2. Open right rear doors.
3. Remove six screws (Figure 1, Item 1), washers (Figure 1, Item 2), and plate (Figure 1, Item 3).
4. Tag and disconnect cables and wires from main load contactor (Figure 1, Item 4).
5. Remove four screws (Figure 1, Item 5), washers (Figure 1, Item 6), lockwashers (Figure 1, Item 7), and main load contactor (Figure 1, Item 4).

REMOVAL - Continued

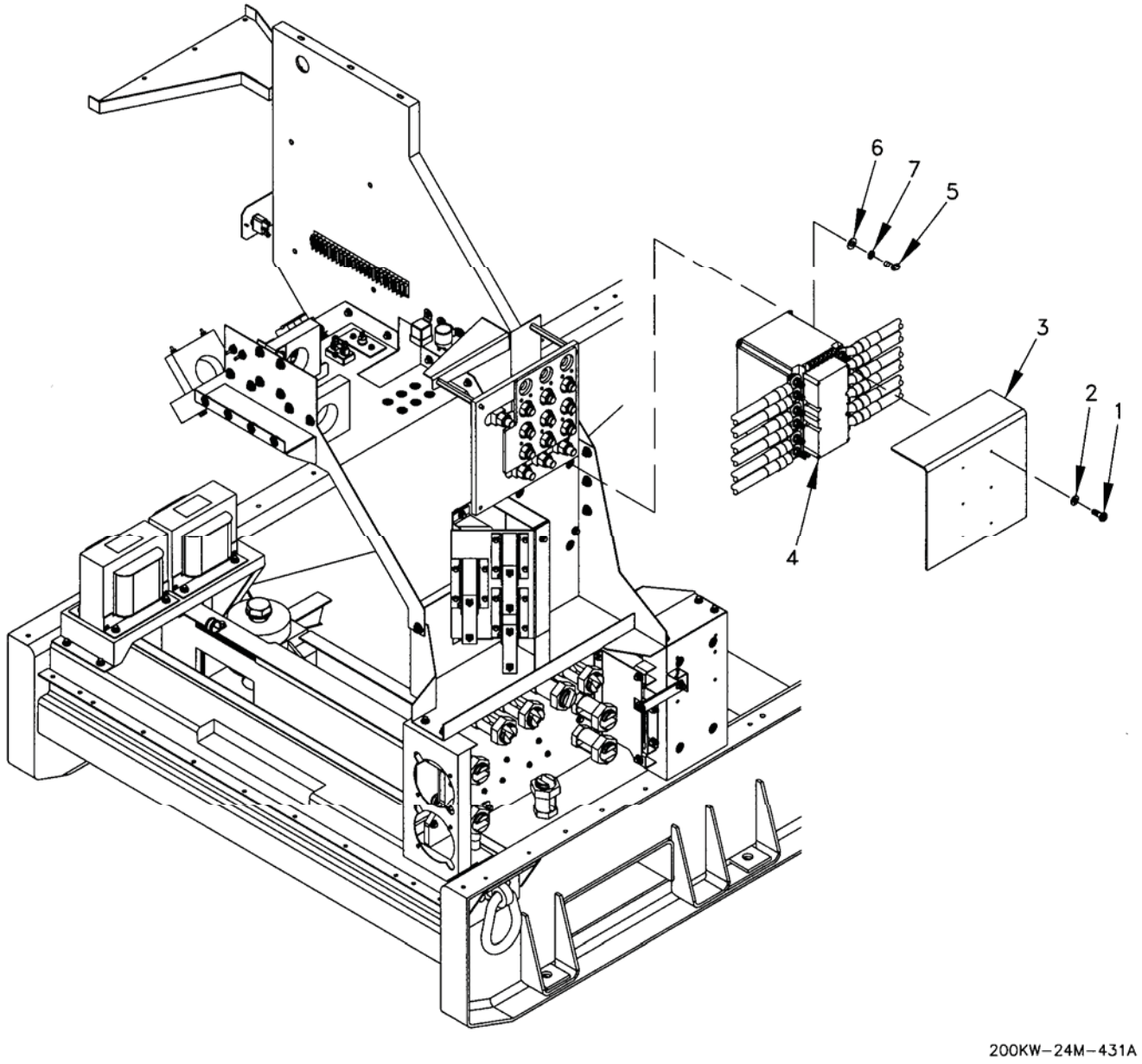

Figure 1. Main Load Contactor.

END OF TASK

INSTALLATION

1. Install main load contactor (Figure 1, Item 4) with four lockwashers (Figure 1, Item 7), washers (Figure 1, Item 6), and screws (Figure 1, Item 5).
2. Remove tags and connect wires and cables to main load contactor (Figure 1, Item 4).
3. Install plate (Figure 1, Item 3), six washers (Figure 1, Item 2), and screws (Figure 1, Item 1).
4. Close right rear doors.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

BATTERIES MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Tool Kit, General Mechanic s (WP 0123, Item 1)

Materials/Parts

Marker tags (WP 0124, Item 49)

Personnel Required

Two

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

When disconnecting or removing batteries, disconnect the negative lead that connects directly to the grounding stud first. Disconnect the negative end of the interconnection cable next. When installing batteries, reverse the connection sequence. Failure to comply can cause serious injury to personnel.

WARNING

Each battery weighs more than 70 pounds (32 kg) and requires a two-person lift. Lifting batteries can cause back strain. Ensure proper lifting techniques are used when lifting batteries. Failure to comply can cause injury to personnel.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Ensure there is no external cable connected to slave receptacle.

3. Open battery access doors.

NOTE

When looking into battery compartment, batteries are identified from left to right as BT4, BT2, BT1, and BT3.

4. Tag cables and remove battery terminal knob (Figure 1, Item 3), lock washer (Figure 1, Item 3A), and flat washer (Figure 1, Item 3B) that secure battery cable 1B40 (Figure 1, Item 1) and battery cable 1A40 (Figure 1, Item 2) to battery BT2 negative terminal. Remove battery cables 1A40 and 1B40.

5. Tag cable and remove battery terminal knob (Figure 1, Item 5), lock washer (Figure 1, Item 5A), and flat washer (Figure 1, Item 5B) and battery terminal knob (Figure 1, Item 6), lock washer (Figure 1, Item 6A), and flat washer (Figure 1, Item 6B) that secure battery cable 12B40 (Figure 1, Item 4) to battery BT3 negative terminal and BT1 negative terminal. Remove battery cable 12B40.

6. Tag cables and remove battery terminal knob (Figure 1, Item 8), lock washer (Figure 1, Item 8A), and flat washer (Figure 1, Item 8B) that secure battery cable 1D40 (Figure 1, Item 7) and battery cable 1B40 (Figure 1, Item 1) to battery BT4 negative terminal. Remove battery cables 1D40 and 1B40.

7. Tag cable and remove battery terminal knob (Figure 1, Item 6), lock washer (Figure 1, Item 6A), and flat washer (Figure 1, Item 6B) and battery terminal knob (Figure 1, Item 10), lock washer (Figure 1, Item 10A), and flat washer (Figure 1, Item 10B) that secure battery cable 12A40 (Figure 1, Item 9) to battery BT1 negative terminal and battery BT2 positive terminal. Remove battery cable 12A40.

8. Tag cable and remove battery terminal knob (Figure 1, Item 12), lock washer (Figure 1, Item 12A), and flat washer (Figure 1, Item 12B) that secure battery cable 12C40 (Figure 1, Item 11) to battery BT4 positive terminal. Remove battery cable 12C40.

9. Tag cables and remove battery terminal knob (Figure 1, Item 15), lock washer (Figure 1, Item 15A), and flat washer (Figure 1, Item 15B) that secure battery cable 24A40 (Figure 1, Item 13) and battery cable 24B40 (Figure 1, Item 14) to battery BT1 positive terminal.

10. Tag cables and remove battery terminal knob (Figure 1, Item 17), lock washer (Figure 1, Item 17A), and flat washer (Figure 1, Item 17B) that secure battery cable 24B40 (Figure 1, Item 14) and battery cable 24H40 (Figure 1, Item 16) to battery BT3 positive terminal. Remove battery cable 24B40.

11. Remove five nuts (Figure 1, Item 18), lockwashers (Figure 1, Item 19), washers (Figure 1, Item 20), and pull battery hold down angle (Figure 1, Item 21) off five threaded rods (Figure 1, Item 22).

12. Remove battery BT4 (Figure 1, Item 23), battery BT2 (Figure 1, Item 24), BT1 (Figure 1, Item 25), and BT3 (Figure 1, Item 26).

REMOVAL - Continued

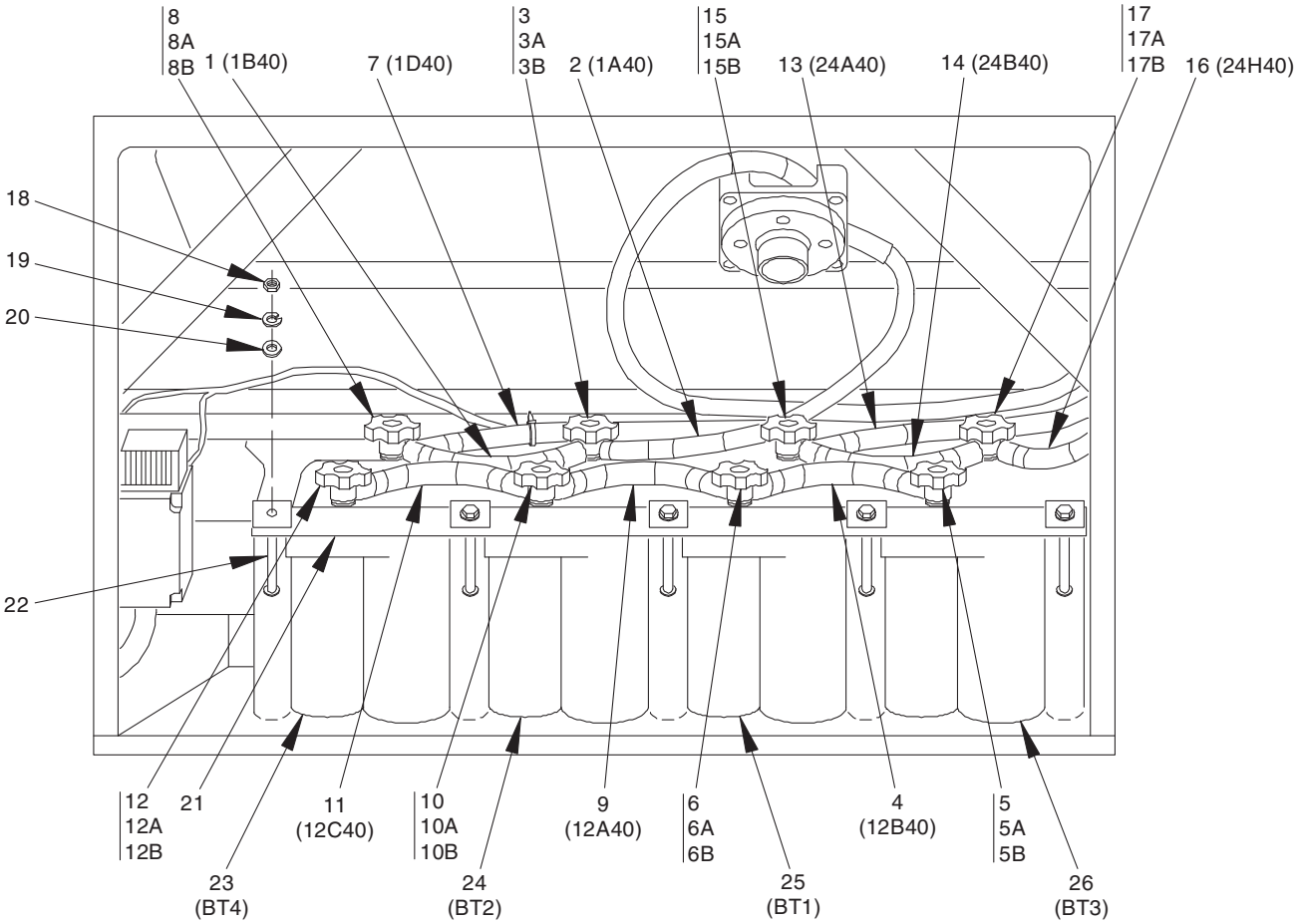

Figure 1. Batteries.

END OF TASK

TEST AND INSPECTION

NOTE

The testing and charging procedures apply only to the absorbed glass mat (AGM) type batteries supplied with the TQG.

Do not mix AGM batteries with conventional flooded lead acid batteries, or reduced capacity, shorter battery life, and possible undercharge problems may occur.

1. Allow battery to sit for at least 3 hours, preferably 8 hours. The battery must be disconnected from any load or any other battery, and the ambient temperature should be approximately 70 degrees F (21 degrees C). Use the battery load tester to measure the open circuit voltage across the terminals for 12.8 to 13 Vdc, indicating a fully charged battery.

2. If battery is not fully charged, charge the battery, using the SEALED or GEL setting on the battery charger, before proceeding.

3. If battery is fully charged, apply a load of 550 amps for 15 seconds. Check the open circuit voltage again for a minimum or 9.6 Vdc.

4. If open circuit voltage is 9.6 Vdc or above, recharge the battery using the SEALED or GEL setting on the battery charger.

5. If the open circuit voltage is less than 9.6 Vdc, battery is defective and must be replaced.

END OF TASK

INSTALLATION

NOTE

Make sure batteries are oriented so that BT4 and BT2 have positive terminals toward battery access doors, and BT1 and BT3 have negative terminals toward battery access doors.

1. Install battery BT3 (Figure 1, Item 26), BT1 (Figure 1, Item 25), BT2 (Figure 1, Item 24), and BT4 (Figure 1, Item 23).

2. Position battery hold down angle (Figure 1, Item 21) on five threaded rods (Figure 1, Item 22) and install five washers (Figure 1, Item 20), lockwashers (Figure 1, Item 19), and nuts (Figure 1, Item 18).

3. Install battery cable 24H40 (Figure 1, Item 16) and battery cable 24B40 (Figure 1, Item 14) on battery BT3 positive terminal and secure with flat washer (Figure 1, Item 17B), lock washer (Figure 1, Item 17A), and battery terminal knob (Figure 1, Item 17). Remove tags from battery cables.

4. Install battery cable 24B40 (Figure 1, Item 14) and battery cable 24A40 (Figure 1, Item 13) on battery BT1 positive terminal and secure with flat washer (Figure 1, Item 15B), lock washer (Figure 1, Item 15A), and battery terminal knob (Figure 1, Item 15). Remove tags from battery cables.

INSTALLATION - Continued

5. Install battery cable 12C40 (Figure 1, Item 11) on battery BT2 positive terminal and battery BT4 positive terminal and secure with flat washer (Figure 1, Item 10B), lock washer (Figure 1, Item 10A), and battery terminal knob (Figure 1, Item 10) and flat washer (Figure 1, Item 12B), lock washer (Figure 1, Item 12A), and battery terminal knob (Figure 1, Item 12). Remove tags from battery cables.

6. Install battery cable 12A40 (Figure 1, Item 9) on battery BT1 negative terminal and battery BT2 positive terminal and secure with flat washer (Figure 1, Item 6B), lock washer (Figure 1, Item 6A), and battery terminal knob (Figure 1, Item 6) and flat washer (Figure 1, Item 10B), lock washer (Figure 1, Item 10A), and battery terminal knob (Figure 1, Item 10). Remove tags from battery cables.

7. Install battery cable 1B40 (Figure 1, Item 1) and battery cable 1D40 (Figure 1, Item 7) on battery BT4 negative terminal and secure with flat washer (Figure 1, Item 8B), lock washer (Figure 1, Item 8A), and battery terminal knob (Figure 1, Item 8). Remove tags from battery cables.

8. Install battery cable 12B40 (Figure 1, Item 4) on battery BT3 negative terminal and battery BT1 negative terminal and secure with flat washer (Figure 1, Item 5B), lock washer (Figure 1, Item 5A), and battery terminal knob (Figure 1, Item 5) and flat washer (Figure 1, Item 6B), lock washer (Figure 1, Item 6A), and battery terminal knob (Figure 1, Item 6). Remove tag from battery cable.

9. Install battery cable 1B40 (Figure 1, Item 1) and battery cable 1A40 (Figure 1, Item 2) on battery BT2 negative terminal and secure with flat washer (Figure 1, Item 3B), lock washer (Figure 1, Item 3A), and battery terminal knob (Figure 1, Item 3). Remove tags from battery cables.

10. Close battery access doors.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
BATTERY DISCONNECT SWITCH MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic s (WP 0123, Item 1)

Personnel Required

One

Materials/Parts

Marker tags (WP 0124, Item 49)

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

When disconnecting or removing batteries, disconnect the negative lead that connects directly to the grounding stud first. Disconnect the negative end of the interconnection cable next. When installing batteries, reverse the connection sequence. Failure to comply can cause serious injury to personnel.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.
2. Ensure there is no external cable connected to slave receptacle.
3. Open battery access doors.

REMOVAL - Continued

NOTE

When looking into battery compartment, batteries are identified from left to right as BT4, BT2, BT1, and BT3.

4. Tag cables and remove battery terminal knob (Figure 1, Item 3), lock washer (Figure 1, Item 3A), and flat washer (Figure 1, Item 3B) that secure battery cable 1B40 (Figure 1, Item 2) and battery cable 1A40 (Figure 1, Item 1) to battery BT2 negative terminal. Remove battery cables 1A40 and 1B40.

5. Tag cable and remove battery terminal knob (Figure 1, Item 5), lock washer (Figure 1, Item 5A), and flat washer (Figure 1, Item 5B) that secure battery cable 1B40 (Figure 1, Item 2) and battery cable 1D40 (Figure 1, Item 4) to battery BT4 negative terminal. Remove battery cable 1B40.

6. Tag cables and remove battery terminal knob (Figure 1, Item 8), lock washer (Figure 1, Item 8A), and flat washer (Figure 1, Item 8B) that secure battery cable 12B40 (Figure 1, Item 6) and battery cable 12A40 (Figure 1, Item 7) to battery BT1 negative terminal.

7. Tag cable and remove battery terminal knob (Figure 1, Item 9), lock washer (Figure 1, Item 9A), and flat washer (Figure 1, Item 9B) that secure battery cable 12B40 (Figure 1, Item 6) to battery BT3 negative terminal. Remove battery cable 12B40.

8. Remove four screws (Figure 1, Item 10), lockwashers (Figure 1, Item 11), and washers (Figure 1, Item 12), and pull battery disconnect switch (Figure 1, Item 13) away from wall.

9. At rear of battery disconnect switch (Figure 1, Item 13), tag and disconnect battery cables 1A40 (Figure 1, Item 1) and 2A40 (Figure 1, Item 14).

10. Remove battery disconnect switch (Figure 1, Item 13). Tag and disconnect wires from BDS.

END OF TASK

INSTALLATION

1. Connect battery 2A40 (Figure 1, Item 14) and 1A40 and sensor cables (Figure 1, Item 1).

2. Install battery disconnect switch (Figure 1, Item 13) with four washers (Figure 1, Item 12), lockwashers (Figure 1, Item 11), and screws (Figure 1, Item 10).

3. Install battery cable 12B40 (Figure 1, Item 6) on battery BT3 negative terminal and secure with flat washer (Figure 1, Item 9B), lock washer (Figure 1, Item 9A), and battery terminal knob (Figure 1, Item 9). Remove tag from battery cable.

4. Install battery cable 12A40 (Figure 1, Item 7) and battery cable 12B40 (Figure 1, Item 6) on battery BT1 negative terminal and secure with flat washer (Figure 1, Item 8B), lock washer (Figure 1, Item 8A), and battery terminal knob (Figure 1, Item 8). Remove tags from battery cables.

5. Install battery cable 1B40 (Figure 1, Item 2) and battery cable 1D40 (Figure 1, Item 4) on battery BT4 negative terminal and secure with flat washer (Figure 1, Item 5B), lock washer (Figure 1, Item 5A), and battery terminal knob (Figure 1, Item 5). Remove tags from battery cables.

6. Install battery cable 1B40 (Figure 1, Item 2) and battery cable 1A40 (Figure 1, Item 1) on battery BT2 negative terminal and secure with flat washer (Figure 1, Item 3B), lock washer (Figure 1, Item 3A), and battery terminal knob (Figure 1, Item 3). Remove tags from battery cables.

7. Close battery access doors.

INSTALLATION - Continued

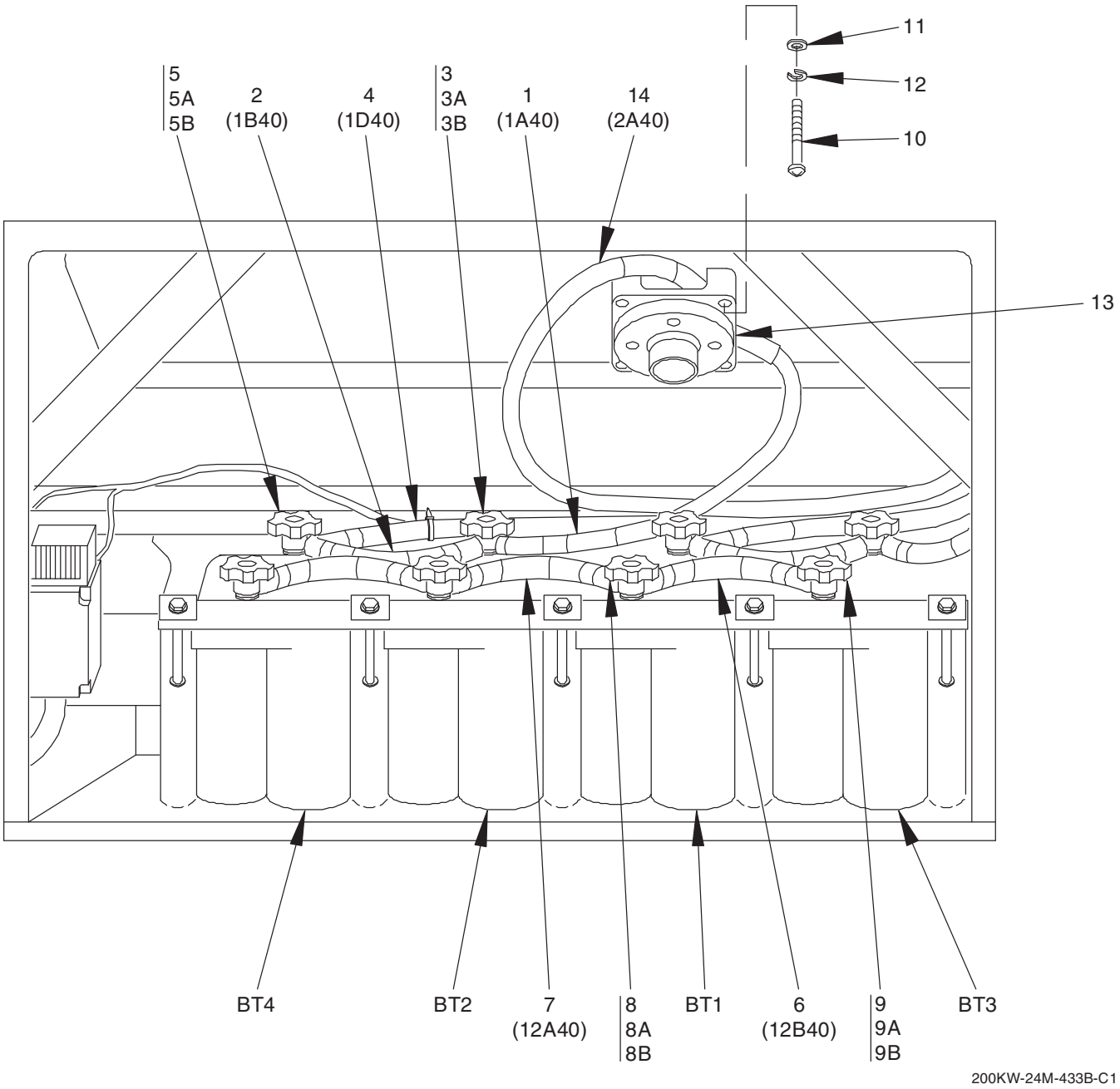

Figure 1. Battery Disconnect Switch.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

CURRENT TRANSFORMERS MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Personnel Required

One

Materials/Parts

Marker tags (WP 0124, Item 49)
Tiedown straps (WP 0124, Item 47)

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

Dangerously high voltage can exist across current transformer (CT) output with engine running. CT could explode if disconnected from load with engine running. Do not disconnect CT with generator rotating. Failure to comply can cause serious injury or death to personnel.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Open right rear doors.

3. Open left rear doors.

NOTE

Each current transformer has two cables running through it. These cables must be disconnected at one end in order to remove the current transformer.

Cut tiedown straps as required.

4. Tag and disconnect cables running through three current transformers (Figure 1, Sheet 1, Item 1. Tag and remove sensor wires located on top of current transformers.

5. Remove twelve screws (Figure 1, Sheet 1, Item 2), washers (Figure 1, Sheet 1, Item 3), lockwashers (Figure 1, Sheet 1, Item 4), and three current transformers (Figure 1, Sheet 1, Item 1).

6. If necessary, remove four screws (Figure 1, Sheet 1, Item 5), washers (Figure 1, Sheet 1, Item 6), lockwashers (Figure 1, Sheet 1, Item 7), and current transformer bracket (Figure 1, Sheet 1, Item 8).

7. Tag and disconnect cables running through three current transformers (Figure 1, Sheet 2, Item 9). Tag and remove sensor wires located on top of current transformers.

8. Remove twelve screws (Figure 1, Sheet 2, Item 10), washers (Figure 1, Sheet 2, Item 11), lockwashers (Figure 1, Sheet 2, Item 12), and three current transformers (Figure 1, Sheet 2, Item 9).

9. Tag and disconnect cable running through current transformer (Figure 1, Sheet 2, Item 13. Tag and remove sensor wires located on top of current transformers.

10. Remove four screws (Figure 1, Sheet 2, Item 14), washers (Figure 1, Sheet 2, Item 15), lockwashers (Figure 1, Sheet 2, Item 16), and current transformer (Figure 1, Sheet 2, Item 13).

END OF TASK

INSTALLATION

1. Put one end of cables through current transformer (Figure 1, Sheet 2, Item 13) to be installed above two power transformers, remove tag, and connect end of cable.

2. Install current transformer (Figure 1, Sheet 2, Item 13), four lockwashers (Figure 1, Sheet 2, Item 16), washers (Figure 1, Sheet 2, Item 15), and screws (Figure 1, Sheet 2, Item 16). Connect sensor wires to current transformer (Figure 1, Sheet 2, Item 13).

3. Put one end of cables through each of three current transformers (Figure 1, Sheet 2, Item 9) to be installed above the generator, remove tags, and connect end of each cable.

4. Install three current transformers (Figure 1, Sheet 2, Item 9), six lockwashers (Figure 1, Sheet 2, Item 12), washers (Figure 1, Sheet 2, Item 11), and screws (Figure 1, Sheet 2, Item 10). Remove tags and connect sensor wires located on top of current transformers.

INSTALLATION - Continued

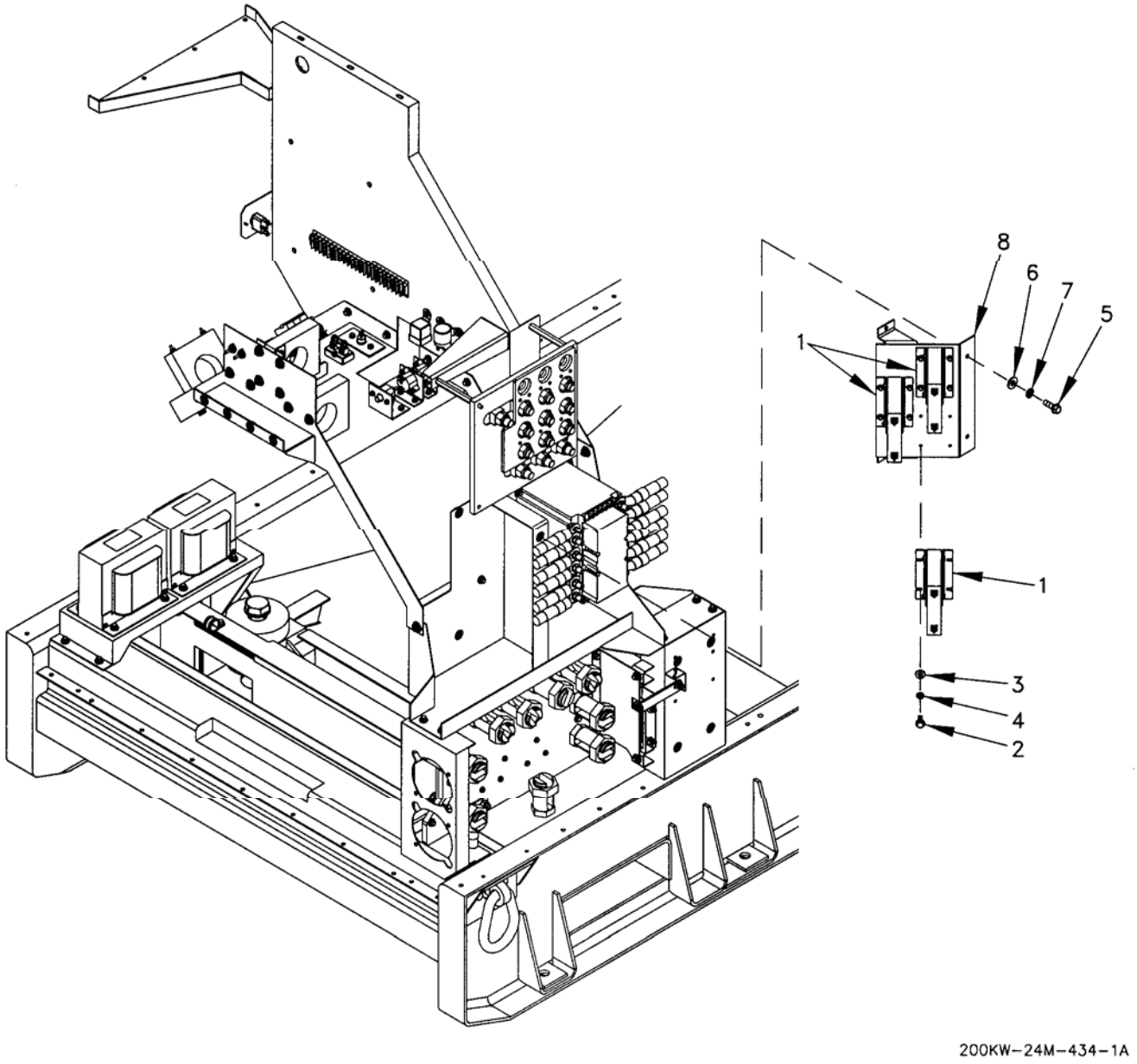

Figure 1. Current Transformers (Sheet 1 of 2).

INSTALLATION - Continued

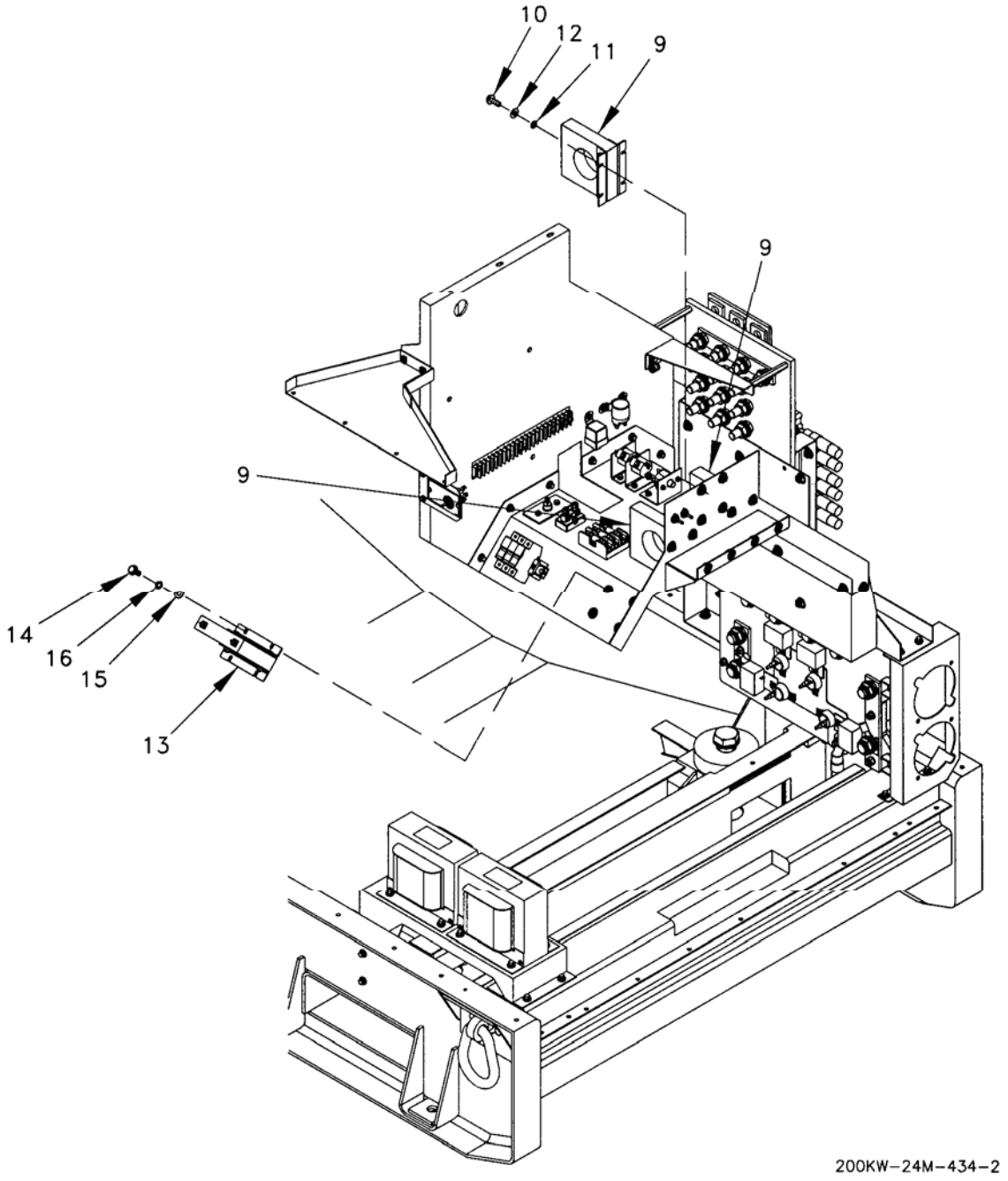

Figure 1. Current Transformers (Sheet 2 of 2).

INSTALLATION - Continued

5. Install current transformer bracket (Figure 1, Sheet 1, Item 8), four lockwashers (Figure 1, Sheet 1, Item 7), washers (Figure 1, Sheet 1, Item 6), and screws (Figure 1, Sheet 1, Item 5).

6. Put one end of cables through each of three current transformers (Figure 1, Sheet 1, Item 1) to be installed adjacent to main load contactor, remove tags, and connect end of each cable.

7. Install three current transformers (Figure 1, Sheet 1, Item 1), six lockwashers (Figure 1, Sheet 1, Item 4), washers (Figure 1, Sheet 1, Item 3), and screws (Figure 1, Sheet 1, Item 2). Remove tags and connect sensor wires located on top of current transformers.

8. Close left rear doors.

9. Close right rear doors.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
POTENTIAL TRANSFORMER MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

References

TM 9-6115-730-24P

Materials/Parts

Marker tags (WP 0124, Item 49)
Tiedown straps (WP 0124, Item 48)

Equipment Condition

Generator access panel assembly removed (WP 0033)

Personnel Required

One

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

NOTE

Cut tiedown straps as required.

2. Tag and disconnect wire harness from potential transformers PT3 (Figure 1, Item 1) and PT2 (Figure 1, Item 2).

REMOVAL - Continued

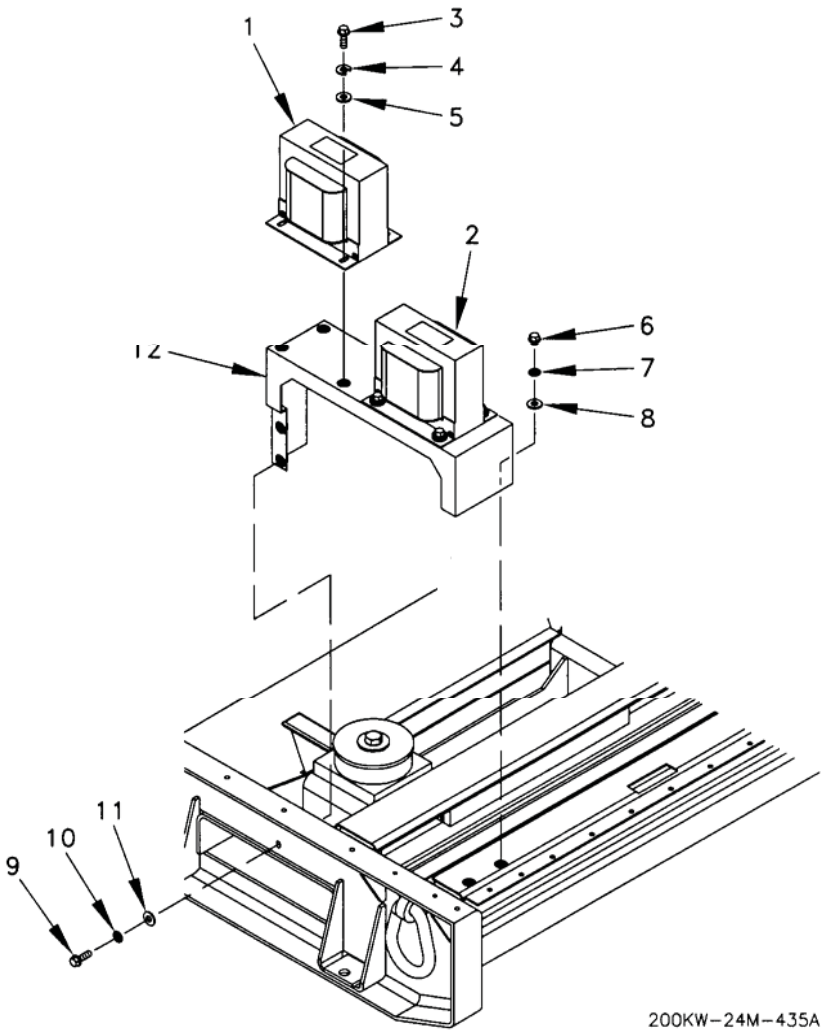

Figure 1. Potential Transformer.

3. Remove four screws (Figure 1, Item 3), lockwashers (Figure 1, Item 4), washers (Figure 1, Item 5), and transformer PT3 (Figure 1, Item 1). Repeat for transformer PT2 (Figure 1, Item 2).

4. If removing bracket, remove two screws (Figure 1, Item 6), lockwashers (Figure 1, Item 7), and washers (Figure 1, Item 8).

5. If removing bracket, remove two screws (Figure 1, Item 9), lockwashers (Figure 1, Item 10), washers (Figure 1, Item 11), and potential transformer bracket (Figure 1, Item 12).

END OF TASK

INSTALLATION

NOTE

Install tiedown straps as required.

1. If bracket was removed, install potential transformer bracket (Figure 1, Item 12), two washers (Figure 1, Item 11), lockwashers (Figure 1, Item 10), and screws (Figure 1, Item 8).

2. If bracket was removed, install two washers (Figure 1, Item 8), lockwashers (Figure 1, Item 7), and screws (Figure 1, Item 6).

3. Install potential transformer PT2 (Figure 1, Item 2), four washers (Figure 1, Item 5), lockwashers (Figure 1, Item 4), and screws (Figure 1, Item 3). Repeat for potential transformer PT3 (Figure 1, Item 1).

4. Remove tags and connect wire harness to potential transformers PT2 (Figure 1, Item 2) and PT3 (Figure 1, Item 1).

5. Install generator access panel (WP 0033).

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

SLAVE RECEPTACLE MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic s (WP 0123, Item 1)

Personnel Required

One

Materials/Parts

Marker tags (WP 0124, Item 49)
Tiedown straps (WP 0124, Item 46)

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

When disconnecting or removing batteries, disconnect the negative lead that connects directly to the grounding stud first. Disconnect the negative end of the interconnection cable next. When installing batteries, reverse the connection sequence. Failure to comply can cause serious injury to personnel.

Slave receptacle (NATO connector) is electrically live at all times and is unfused. The Battery Disconnect Switch does not remove power from the slave receptacle. NATO slave receptacle has 24 VDC even when Battery Disconnect Switch is set of OFF. This circuit is only dead when the batteries are fully disconnected. Disconnect batteries before performing maintenance on the slave receptacle. Failure to comply can cause injury or death to personnel.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Ensure there is no external cable connected to slave receptacle.

3. Open battery access doors. Open left front door.

NOTE

When looking into battery compartment, batteries are identified from left to right as BT4, BT2, BT1, and BT3.

Cut tiedown straps as required.

4. Tag cables and remove battery terminal knob (Figure 1, Item 2), lock washer (Figure 1, Item 2A), and flat washer (Figure 1, Item 2B) that secure battery cable 1A40 (Figure 1, Item 1) to battery BT2 negative terminal. Remove battery cable 1A40.

5. Tag cable and remove battery terminal knob (Figure 1, Item 4), lock washer (Figure 1, Item 4A), and flat washer (Figure 1, Item 4B) that secure battery cable 1D40 (Figure 1, Item 3) to battery BT4 negative terminal. Remove battery cable 1D40.

6. Tag cable and remove battery terminal knob (Figure 1, Item 6), lock washer (Figure 1, Item 6A), and flat washer (Figure 1, Item 6B) that secure battery cable 24H40 (Figure 1, Item 5) to battery BT3 positive terminal.

7. Remove four nuts (Figure 1, Item 7), screws (Figure 1, Item 8), washers (Figure 1, Item 9), and slave receptacle (Figure 1, Item 10) out of TQG.

8. Tag and disconnect battery cables 1D40 (Figure 1, Item 3) and 24H40 (Figure 1, Item 5) from slave receptacle (Figure 1, Item 10).

9. Remove eight locknuts (Figure 1, Item 11), washers (Figure 1, Item 12), screws (Figure 1, Item 13) and pocket (Figure 1, Item 14).

INSTALLATION

NOTE

Install tiedown straps as required.

1. Install pocket (Figure 1, Item 14), eight screws (Figure 1, Item 13), washers (Figure 1, Item 12), and locknuts (Figure 1, Item 11).

2. Remove tags and connect battery cables 1D40 (Figure 1, Item 3) and 24H40 (Figure 1, Item 5) to slave receptacle (Figure 1, Item 10).

3. Install slave receptacle (Figure 1, Item 10) with four washers (Figure 1, Item 9), screws (Figure 1, Item 8), and nuts (Figure 1, Item 7).

INSTALLATION - Continued

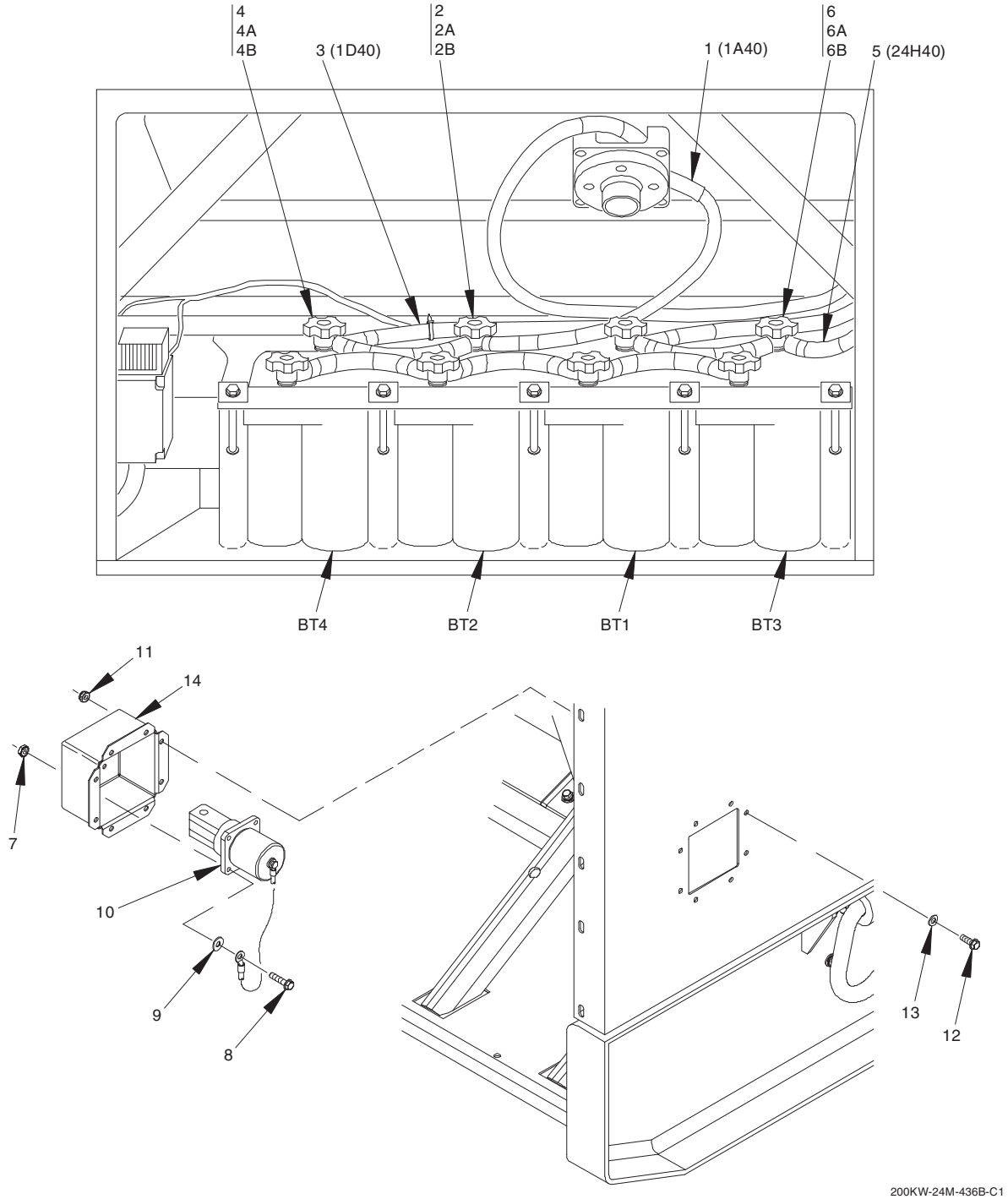

Figure 1. Slave Receptacle.

INSTALLATION - Continued

4. Install battery cable 24H40 (Figure 1, Item 5) on battery BT3 positive terminal and secure with flat washer (Figure 1, Item 6B), lock washer (Figure 1, Item 6A), and battery terminal knob (Figure 1, Item 6). Remove tag from battery cable.

5. Install battery cable 1D40 (Figure 1, Item 3) on battery BT4 negative terminal and secure with flat washer (Figure 1, Item 4B), lock washer (Figure 1, Item 4A), and battery terminal knob (Figure 1, Item 4). Remove tag from battery cable.

6. Install battery cable 1A40 (Figure 1, Item 1) on battery BT2 negative terminal and secure with flat washer (Figure 1, Item 2B), lock washer (Figure 1, Item 2A), and battery terminal knob (Figure 1, Item 2). Remove tag from battery cable.

7. Close left front door. Close battery access doors.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

ELECTRICAL INSTALLATION MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Personnel Required

One

Materials/Parts

Marker tags (WP 0124, Item 49)
Tiedown straps (WP 0124, Item 46)

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

REMOVAL

NOTE

Table 1 identifies removal and installation steps for maintenance significant components of the electrical installation. Cut tiedown straps as required.

Table 1. WP 0055 Guide.

NAME	FIGURE 1 ITEM	REMOVAL STEPS	INSTALLATION STEPS
DEAD CRANK SWITCH	1	1 thru 3	13
CATSW1 (RESET SW FUEL)	15	1, 2 and 6	10
CATSW2 (RESET SW OIL)	16	1, 2 and 6	10
Slave relay SRY	19	1, 2 and 7	9
Starter motor magnetic switch (SMMS) relay	23	1, 2 and 8	8
Circuit breaker CB2	47	1, 2 and 13	3
Circuit breaker CB4	46	1, 2 and 13	3
Circuit breaker CB5	45	1, 2 and 13	3
Ammeter shunt R4	37	1, 2 and 11	5
Diode D1	39	1, 2 and 12	4
Fuses F1, F2, and F3	55	1, 2 and 15	1

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Open right rear doors and left rear doors.

3. To remove DEAD CRANK SWITCH (Figure 1, Sheet 1, Item 1), tag and disconnect wires from switch, remove nut (Figure 1, Sheet 1, Item 2), lockwasher (Figure 1, Sheet 1, Item 3), and switch.

REMOVAL - Continued

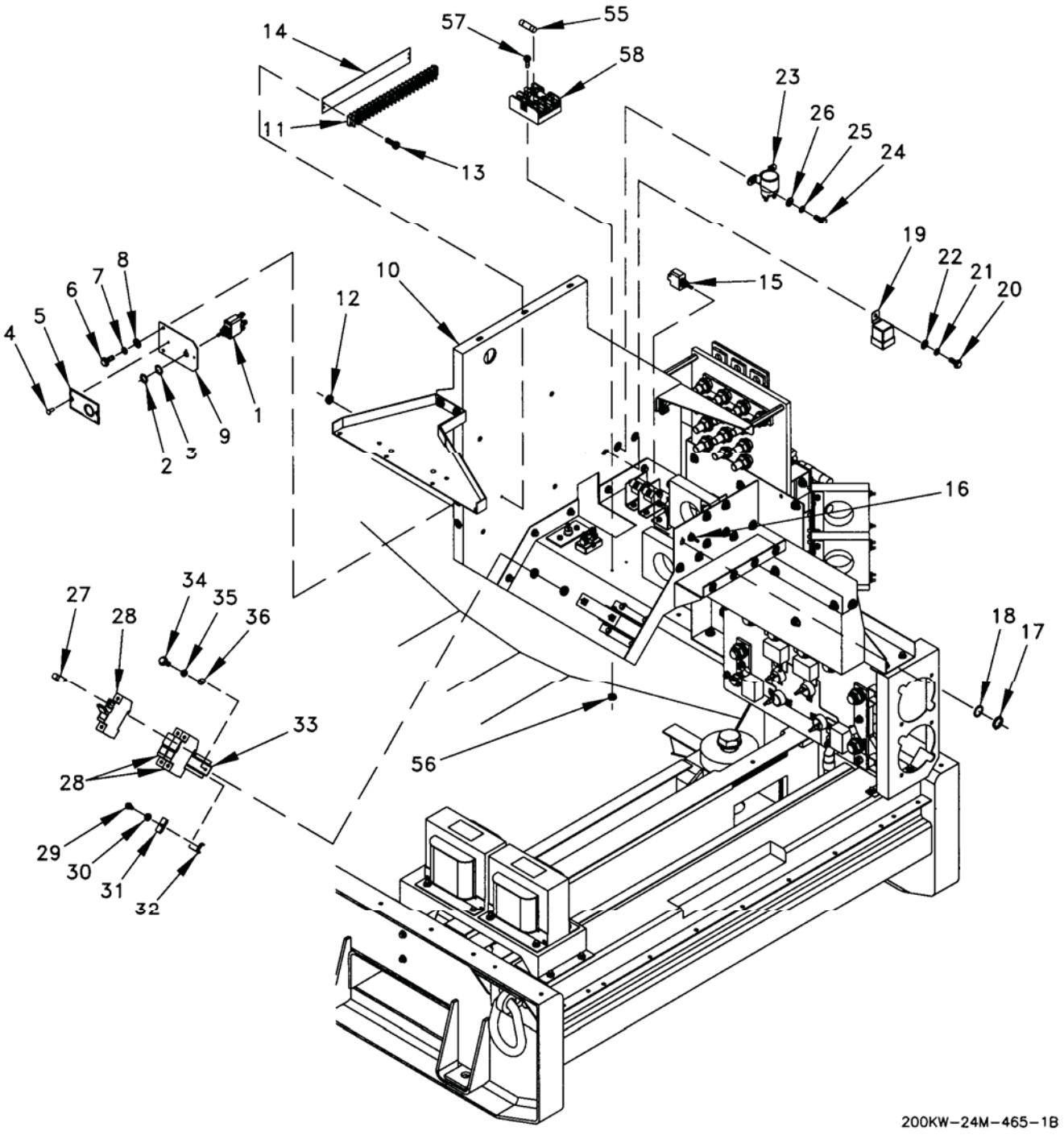

Figure 1. Electrical Installation (Sheet 1 of 2).

REMOVAL - Continued

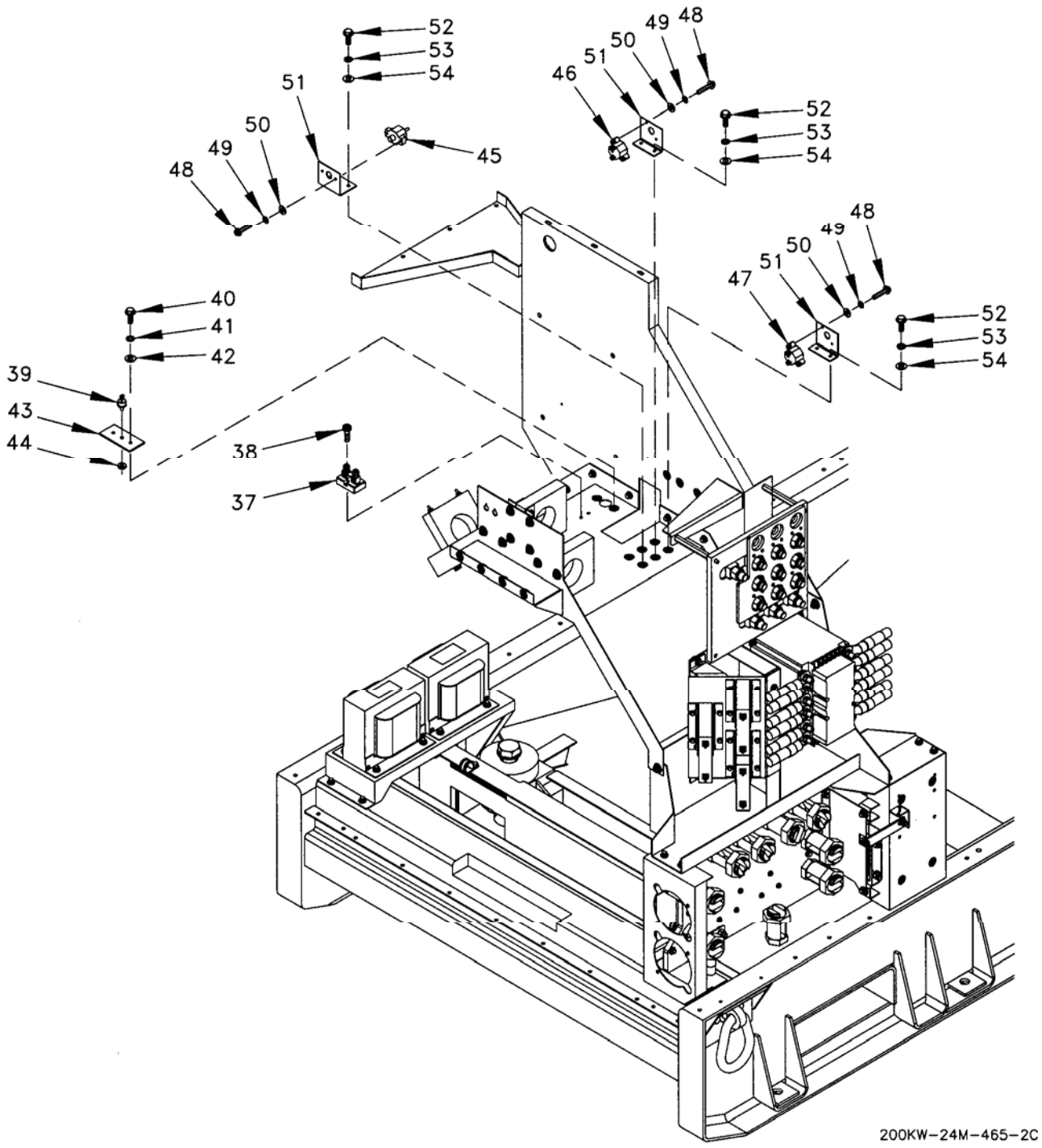

Figure 1. Electrical Installation (Sheet 2 of 2).

REMOVAL - Continued

4. Drill out two rivets (Figure 1, Sheet 1, Item 4), if necessary and remove dead crank plate (Figure 1, Sheet 1, Item 5). Remove two screws (Figure 1, Sheet 1, Item 6), lockwashers (Figure 1, Sheet 1, Item 7), washers (Figure 1, Sheet 1, Item 8), and switch plate (Figure 1, Sheet 1, Item 9) from air cleaner bracket (Figure 1, Sheet 1, Item 10).

5. To remove terminal board TB5 (Figure 1, Sheet 1, Item 11), tag and disconnect wires from terminal board, remove two nuts (Figure 1, Sheet 1, Item 12), screws (Figure 1, Sheet 1, Item 13), terminal board, and marker strip (Figure 1, Sheet 1, Item 14).

6. To remove either switch CATSW1 (Figure 1, Sheet 1, Item 15) or switch CATSW2 (Figure 1, Sheet 1, Item 16), tag and disconnect wires from switch, remove nut (Figure 1, Sheet 1, Item 17), lockwasher (Figure 1, Sheet 1, Item 18), and switch.

7. To remove slave relay (SRY) (Figure 1, Sheet 1, Item 19), tag and disconnect wires from relay SRY, remove screw (Figure 1, Sheet 1, Item 20), washer (Figure 1, Sheet 1, Item 21), lockwasher (Figure 1, Sheet 1, Item 22), and relay.

8. To remove starter motor magnetic switch (SMMS) relay (Figure 1, Sheet 1, Item 23), tag and disconnect wires from SMMS relay, remove two screws (Figure 1, Sheet 1, Item 24), washers (Figure 1, Sheet 1, Item 25), lockwashers (Figure 1, Sheet 1, Item 26), and SMMS relay.

9. To remove any of three spare fuses (Figure 1, Sheet 1, Item 27), pull fuse out of fuseholder (Figure 1, Sheet 1, Item 28). To remove spare fuseholder (Figure 1, Sheet 1, Item 28), remove two screws (Figure 1, Sheet 1, Item 29), washers (Figure 1, Sheet 1, Item 30), insulators (Figure 1, Sheet 1, Item 31), and clips (Figure 1, Sheet 1, Item 32).

10. To remove relay mounting track (Figure 1, Sheet 1, Item 33), remove two screws (Figure 1, Sheet 1, Item 34), lockwashers (Figure 1, Sheet 1, Item 35), washers (Figure 1, Sheet 1, Item 36), and relay mounting track.

11. Two remove ammeter shunt R4 (Figure 1, Sheet 2, Item 37), tag and disconnect wires from shunt, remove two screws (Figure 1, Sheet 2, Item 38) and shunt.

12. To remove diode D1 (Figure 1, Sheet 2, Item 39), tag and disconnect wires from diode, remove two screws (Figure 1, Sheet 2, Item 40), lockwashers (Figure 1, Sheet 2, Item 41), washers (Figure 1, Sheet 2, Item 42), insulator (Figure 1, Sheet 2, Item 43), and diode D1. Remove nut (Figure 1, Sheet 2, Item 44) and diode D1 (Figure 1, Sheet 2, Item 39) from insulator (Figure 1, Sheet 2, Item 43).

13. To remove any of three circuit breakers CB5 (Figure 1, Sheet 2, Item 45), CB4 (Figure 1, Sheet 2, Item 46), or CB2 (Figure 1, Sheet 2, Item 47), remove two screws (Figure 1, Sheet 2, Item 48), lockwashers (Figure 1, Sheet 2, Item 49), washers (Figure 1, Sheet 2, Item 50), and circuit breaker.

14. To remove CB5 CB4, or CB2 brackets (Figure 1, Sheet 2, Item 51), remove two screws (Figure 1, Sheet 2, Item 52), lockwashers (Figure 1, Sheet 2, Item 53), washers (Figure 1, Sheet 2, Item 54), and bracket.

15. Remove three fuses F1, F2, or F3 (Figure 1, Sheet 1, Item 55), two nuts (Figure 1, Sheet 1, Item 56), two screws (Figure 1, Sheet 1, Item 57), and fuseholder (Figure 1, Sheet 1, Item 58).

END OF TASK

INSTALLATION

NOTE

Install tiedown straps as required.

1. Install fuseholder (Figure 1, Sheet 1, Item 58), two screws (Figure 1, Sheet 1, Item 57), two nuts (Figure 1, Sheet 1, Item 56), and three fuses F1, F2, and F3 (Figure 1, Sheet 1, Item 55).

2. To install CB5, CB4, and CB2 circuit breaker brackets (Figure 1, Sheet 2, Item 51), install bracket, two washers (Figure 1, Sheet 2, Item 54), lockwashers (Figure 1, Sheet 2, Item 53), and screws (Figure 1, Sheet 2, Item 52).

3. To install any of three circuit breakers CB2 (Figure 1, Sheet 2, Item 47), CB4 (Figure 1, Sheet 2, Item 46), or CB5 (Figure 1, Sheet 2, Item 45), install circuit breaker, two washers (Figure 1, Sheet 2, Item 50), lockwashers (Figure 1, Sheet 2, Item 49), and screws (Figure 1, Sheet 2, Item 48). Connect wires as tagged.

4. To install diode D1 (Figure 1, Sheet 2, Item 39), install diode, nut (Figure 1, Sheet 2, Item 44), insulator (Figure 1, Sheet 2, Item 43). Install diode and insulator with two washers (Figure 1, Sheet 2, Item 42), lockwashers (Figure 1, Sheet 2, Item 41), and screws (Figure 1, Sheet 2, Item 40). Connect wires as tagged.

5. To install ammeter shunt R4 (Figure 1, Sheet 2, Item 37), install shunt and two screws (Figure 1, Sheet 2, Item 38). Connect wires as tagged.

6. To install relay mounting track (Figure 1, Sheet 1, Item 33), install track, two screws (Figure 1, Sheet 1, Item 34), lockwashers (Figure 1, Sheet 1, Item 35), and washers (Figure 1, Sheet 1, Item 36).

7. To install any spare fuseholder (Figure 1, Sheet 1, Item 28), install fuseholder (Figure 1, Sheet 1, Item 28), two insulators (Figure 1, Sheet 1, Item 31), clips (Figure 1, Sheet 1, Item 32), washers (Figure 1, Sheet 1, Item 30), and two screws (Figure 1, Sheet 1, Item 29). Connect wires as tagged. To install any of three spare fuses (Figure 1, Sheet 1, Item 27), push fuse into fuseholder (Figure 1, Sheet 1, Item 28).

8. To install starter motor magnetic switch (SMMS) relay (Figure 1, Sheet 1, Item 23), install SMMS relay, two lockwashers (Figure 1, Sheet 1, Item 26), washers (Figure 1, Sheet 1, Item 25), and two screws (Figure 1, Sheet 1, Item 24). Connect wires as tagged.

9. To install relay SRY (Figure 1, Sheet 1, Item 19), install relay, lockwasher (Figure 1, Sheet 1, Item 22), washer (Figure 1, Sheet 1, Item 21), and screw (Figure 1, Sheet 1, Item 20). Connect wires as tagged.

10. To install either switch CATSW2 (Figure 1, Sheet 1, Item 16), or CATSW1 (Figure 1, Sheet 1, Item 15), install switch, lockwasher (Figure 1, Sheet 1, Item 18), and nut (Figure 1, Sheet 1, Item 17). Connect wires as tagged.

11. To install terminal board TB5 (Figure 1, Sheet 1, Item 11), install marker strip (Figure 1, Sheet 1, Item 14), terminal board, two screws (Figure 1, Sheet 1, Item 13) and nuts (Figure 1, Sheet 1, Item 12). Connect wires as tagged.

12. Install switch plate (Figure 1, Sheet 1, Item 9) on air cleaner bracket (Figure 1, Sheet 1, Item 10) and secure with two screws (Figure 1, Sheet 1, Item 8), washers (Figure 1, Sheet 1, Item 7), and lockwashers (Figure 1, Sheet 1, Item 6). Install dead crank plate (Figure 1, Sheet 1, Item 5) and secure with two rivets (Figure 1, Sheet 1, Item 4).

INSTALLATION - Continued

13. To install DEAD CRANK SWITCH (Figure 1, Sheet 1, Item 1), install switch, lockwasher (Figure 1, Sheet 1, Item 3), and nut (Figure 1, Sheet 1, Item 2).

14. Close left rear doors and right rear doors.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
FUEL LEVEL SWITCH ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Personnel Required

Two

Materials/Parts

Gasket
Sealing compound (WP 0124, Item 40)
Tiedown straps (WP 0124, Item 47)

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Failure to comply can cause injury or death to personnel.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Open right rear doors.

NOTE

Cut tiedown straps as required.

3. Tag and disconnect wires from fuel level switch (Figure 1, Item 1).

REMOVAL - Continued

CAUTION

Cover hole in fuel tank to prevent contamination.

4. Remove five screws (Figure 1, Item 2), lockwashers (Figure 1, Item 3), washers (Figure 1, Item 4), fuel level switch assembly (Figure 1, Item 1), and gasket (Figure 1, Item 5).

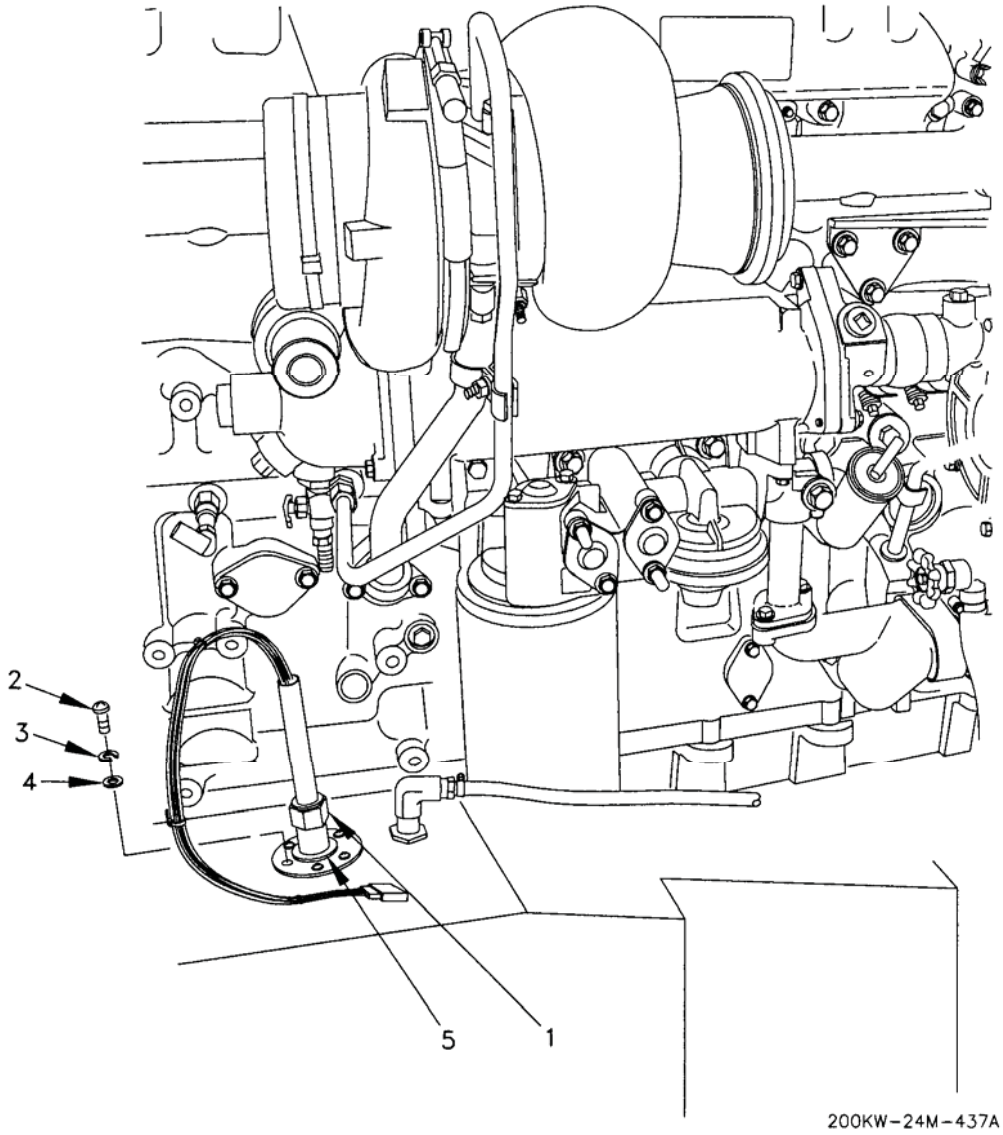

Figure 1. Fuel Level Switch Assembly.

END OF TASK

INSTALLATION

1. Apply sealing compound to both sides of gasket (Figure 1, Item 5) and install gasket, fuel level switch assembly (Figure 1, Item 1), five washers (Figure 1, Item 4), lockwashers (Figure 1, Item 3), and screws (Figure 1, Item 2).

NOTE

Install tiedown straps as required.

2. Remove tags and connect wires to fuel level switch (Figure 1, Item 1).

3. Close right rear doors.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
FUEL HOSES MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic s (WP 0123, Item 1)

Materials/Parts

Sealant (WP 0124, Item 37)
Tiedown straps (WP 0124, Item 46)

Personnel Required

One

References

TM 9-6115-730-24P

Equipment Condition

As necessary, radiator removed (WP 0068)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the fuel system. Ensure fuel pan is available to drain excess fuel in hose assemblies.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Open left front door, left rear doors, and right rear doors.

NOTE

Cut tiedown straps as required.

3. Remove water separator filter drain (Figure 1, Sheet 1, Item 1) from water separator filter (Figure 1, Sheet 1, Item 3).

4. Place drain pan under the water separator filter (Figure 1, Sheet 1, Item 3). Turn plug (Figure 1, Sheet 1, Item 2) counterclockwise to open the self ventilated drain. Drain the fuel from the water separator filter, then retighten plug (Figure 1, Sheet 1, Item 2).

5. Disconnect hose assembly (Figure 1, Sheet 1, Item 4) from fuel pickup tube assembly (Figure 1, Sheet 1, Item 5) and from water separator filter drain (Figure 1, Sheet 1, Item 1).

6. Disconnect swivel ball fitting (Figure 1, Sheet 1, Item 6) from hose (Figure 1, Sheet 1, Item 8) by removing clamp (Figure 1, Sheet 1, Item 7).

7. Disconnect hose (Figure 1, Sheet 1, Item 10) from female connector (Figure 1, Sheet 1, Item 9) by removing clamp (Figure 1, Sheet 1, Item 7).

8. Disconnect female connector (Figure 1, Sheet 1, Item 9) from swivel ball fitting (Figure 1, Sheet 1, Item 6).

9. Disconnect hose (Figure 1, Sheet 1, Item 8) from water separator filter (Figure 1, Sheet 1, Item 3) by removing clamp (Figure 1, Sheet 1, Item 7).

10. Remove two hose clamps and disconnect hose (Figure 1, Sheet 1, Item 11) from elbow (Figure 1, Sheet 1, Item 12) on right side of fuel tank (Figure 1, Sheet 1, Item 13) and from 90 degree male fitting (Figure 1, Sheet 2, Item 14) at rear of fuel tank filler neck (Figure 1, Sheet 2, Item 15).

11. Remove 90 degree male fitting (Figure 1, Sheet 2, Item 14), elbow fitting (Figure 1, Sheet 2, Item 16), nipple (Figure 1, Sheet 2, Item 17), seal nut (Figure 1, Sheet 2, Item 18), and washer (Figure 1, Sheet 2, Item 19).

12. Disconnect hose (Figure 1, Sheet 1, Item 20) from 90 degree bulkhead elbow (Figure 1, Sheet 1, Item 21) on fuel fill pocket (Figure 1, Sheet 1, Item 22). If necessary, remove 90 degree elbow (Figure 1, Sheet 2, Item 21).

13. Disconnect hose (Figure 1, Sheet 2, Item 20) from 90 degree elbow (Figure 1, Sheet 2, Item 23) on auxiliary fuel pump (Figure 1, Sheet 2, Item 24).

REMOVAL - Continued

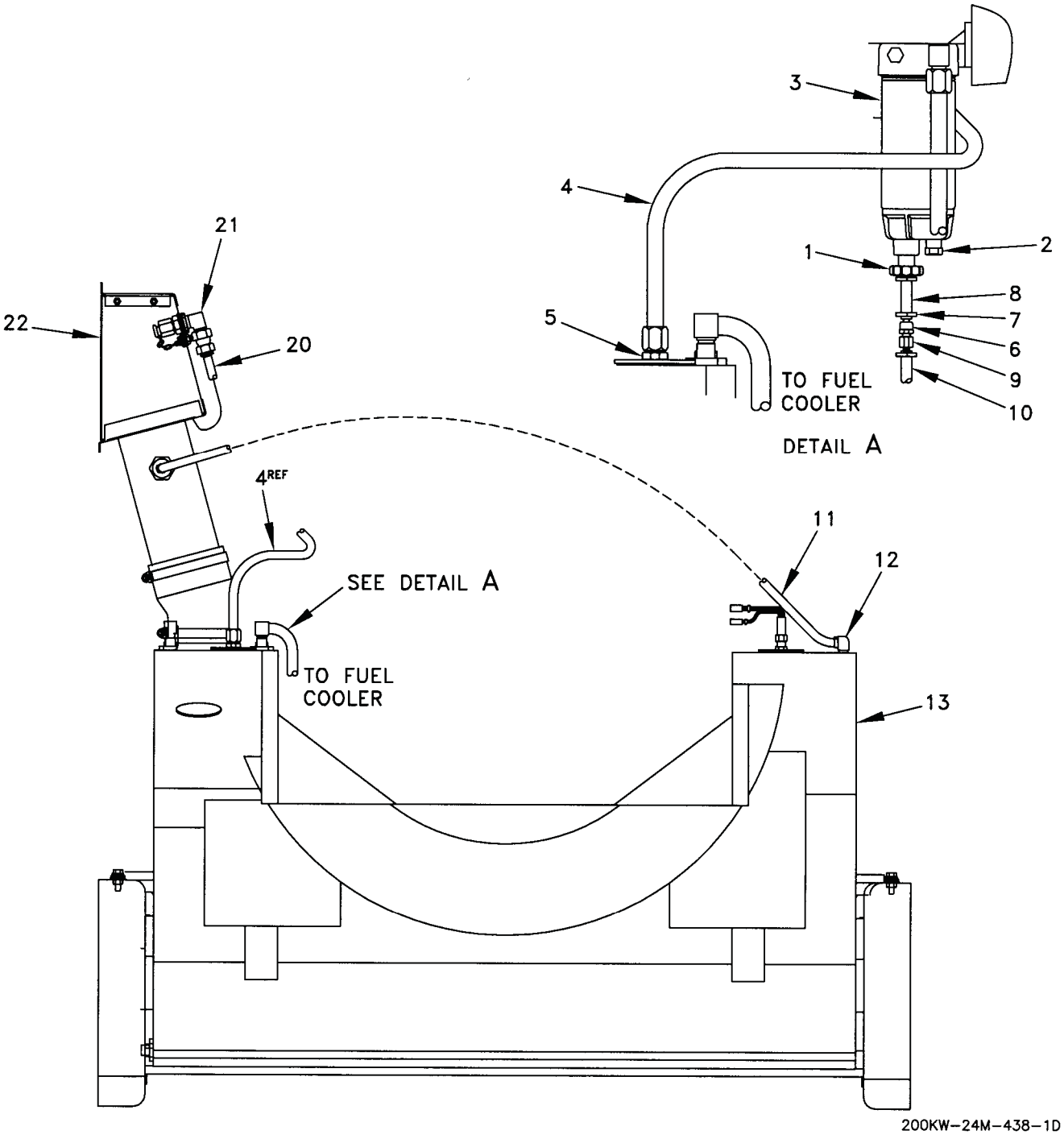

Figure 1. Fuel Hoses (Sheet 1 of 4).

REMOVAL - Continued

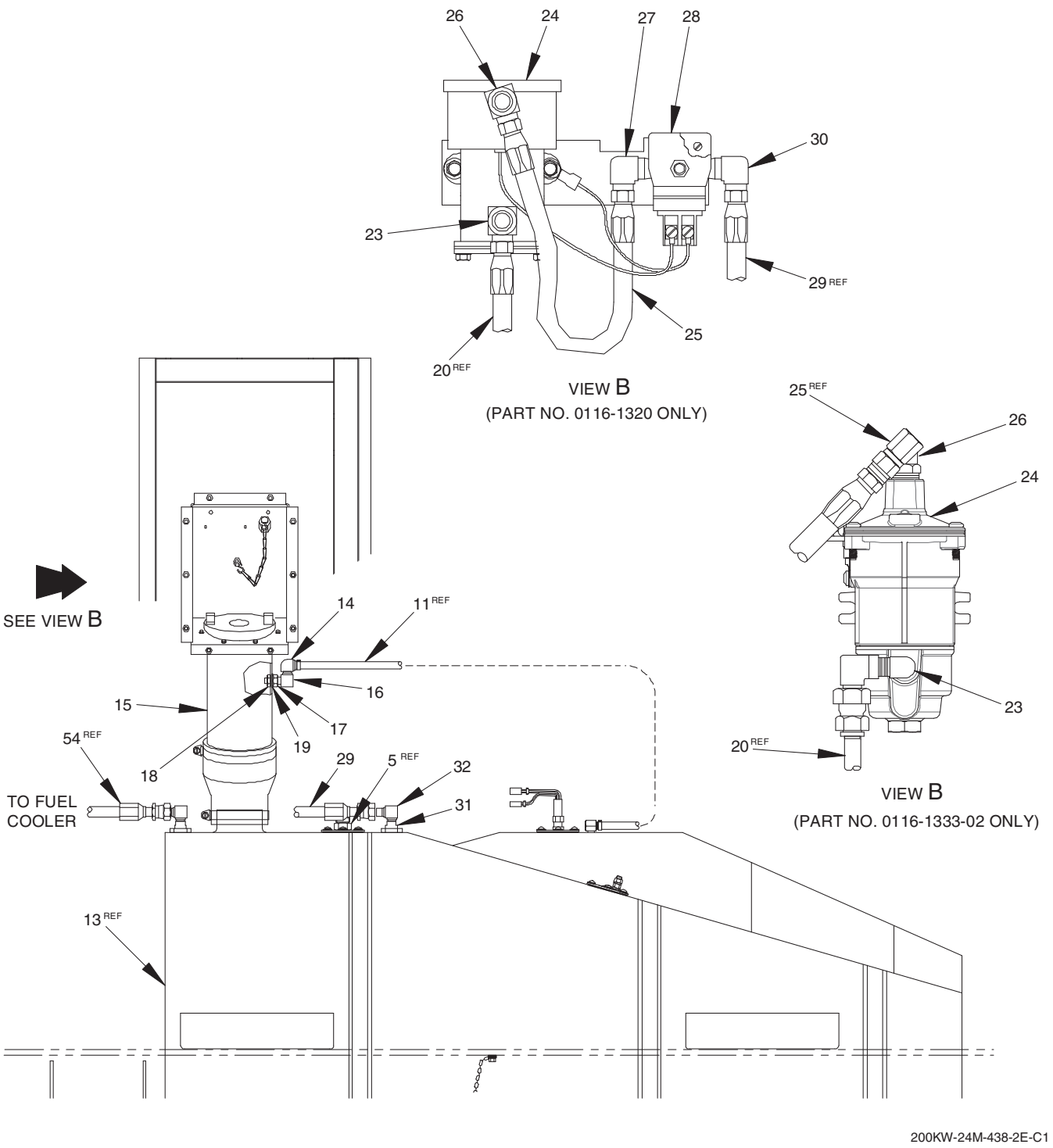

Figure 1. Fuel Hoses (Sheet 2 of 4).

REMOVAL - Continued

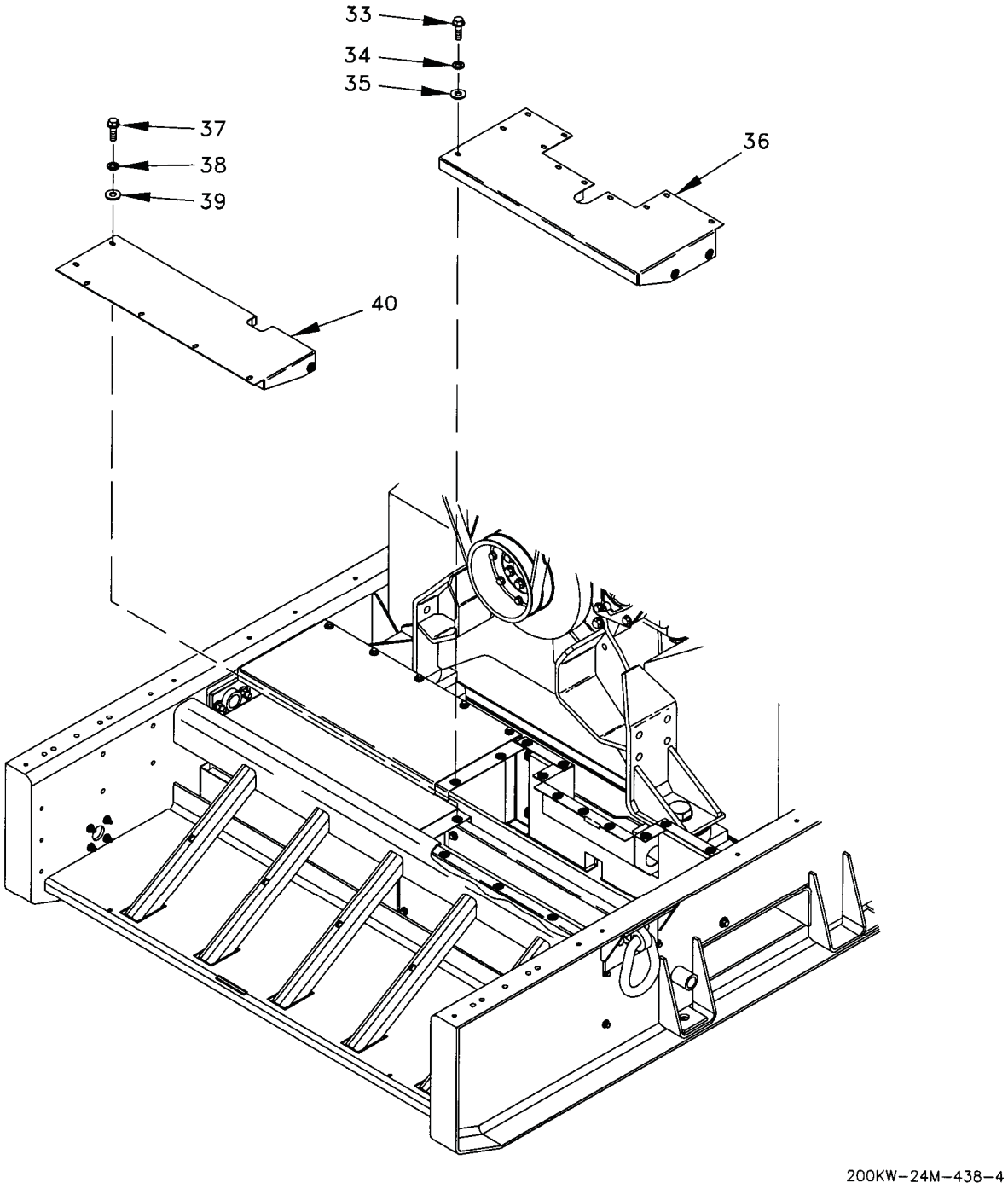

Figure 1. Fuel Hoses (Sheet 3 of 4).

REMOVAL - Continued

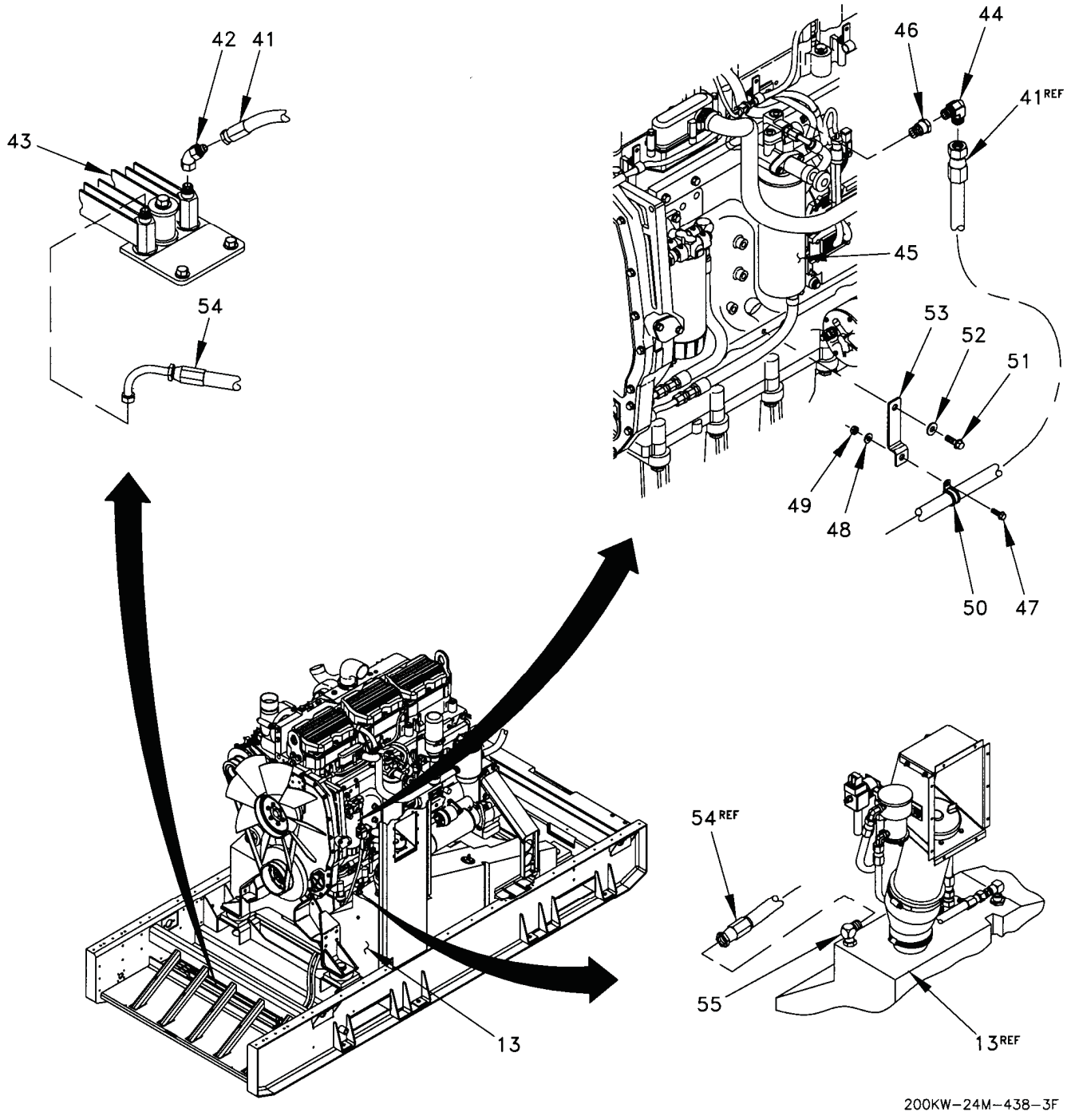

Figure 1. Fuel Hoses (Sheet 4 of 4).

REMOVAL - Continued

14. Disconnect hose (Figure 1, Sheet 2, Item 25) from 90 degree elbow (Figure 1, Sheet 2, Item 26) on auxiliary fuel pump (Figure 1, Sheet 2, Item 24) and from 90 degree elbow (Figure 1, Sheet 2, Item 27) on fuel solenoid valve (Figure 1, Sheet 2, Item 28). Disconnect hose (Figure 1, Sheet 2, Item 29) from 90 degree elbow (Figure 1, Sheet 2, Item 30) on fuel solenoid valve (Figure 1, Sheet 2, Item 28) and adapter (Figure 1, Sheet 2, Item 31) on fuel tank (Figure 1, Sheet 1, Item 13). If necessary, remove 90 degree elbow (Figure 1, Sheet 2, Item 30), 90 degree elbow (Figure 1, Sheet 2, Item 32), and adapter (Figure 1, Sheet 2, Item 31).

15. If necessary, remove 13 bolts (Figure 1, Sheet 3, Item 33), lockwashers (Figure 1, Sheet 3, Item 34), and washers (Figure 1, Sheet 3, Item 35) on left side of upper front panel (Figure 1, Sheet 3, Item 36).

16. If necessary, remove 7 bolts (Figure 1, Sheet 3, Item 37), lockwashers (Figure 1, Sheet 3, Item 38), and washers (Figure 1, Sheet 3, Item 39) on lower front panel (Figure 1, Sheet 3, Item 40) to access fuel cooler fuel lines.

17. Disconnect hose (Figure 1, Sheet 4, Item 41) from 45 degree adapter (Figure 1, Sheet 4, Item 42) on fuel cooler (Figure 1, Sheet 4, Item 43) and from 90 degree elbow (Figure 1, Sheet 4, Item 44) on fuel filter (Figure 1, Sheet 4, Item 45). If necessary, remove 45 degree adapter (Figure 1, Sheet 4, Item 42), 90 degree elbow (Figure 1, Sheet 4, Item 44), and adapter (Figure 1, Sheet 4, Item 46).

18. At two locations on left side of engine, remove two screws (Figure 1, Sheet 4, Item 47), washers (Figure 1, Sheet 4, Item 48), nuts (Figure 1, Sheet 4, Item 49), and loop clamp (Figure 1, Sheet 4, Item 50). Remove two screws (Figure 1, Sheet 4, Item 51), lockwashers (Figure 1, Sheet 4, Item 52), and bracket (Figure 1, Sheet 4, Item 53). Remove hose (Figure 1, Sheet 4, Item 41).

19. Disconnect hose (Figure 1, Sheet 4, Item 54) from fuel cooler (Figure 1, Sheet 4, Item 43) and from elbow (Figure 1, Sheet 4, Item 55) on fuel tank (Figure 1, Sheet 1, Item 13). If necessary, remove elbow (Figure 1, Sheet 4, Item 55).

END OF TASK

INSTALLATION

NOTE

Apply sealing compound to all male pipe threads before connecting.

Install tiedown straps as required.

1. If removed, install elbow (Figure 1, Sheet 4, Item 55) on fuel tank (Figure 1, Sheet 1, Item 13). Connect hose (Figure 1, Sheet 4, Item 54) to elbow (Figure 1, Sheet 4, Item 55) and to fuel cooler (Figure 1, Sheet 4, Item 43).

2. Position two loop clamps (Figure 1, Sheet 4, Item 50) on hose (Figure 1, Sheet 4, Item 41). At two places on left side of engine, install bracket (Figure 1, Sheet 4, Item 53), two lockwashers (Figure 1, Sheet 4, Item 52), and two screws (Figure 1, Sheet 4, Item 51). On each bracket, install loop clamp (Figure 1, Sheet 4, Item 50), two washers (Figure 1, Sheet 4, Item 48), screws (Figure 1, Sheet 4, Item 47), and nuts (Figure 1, Sheet 4, Item 49).

3. If removed, install adapter (Figure 1, Sheet 4, Item 46), 90 degree elbow (Figure 1, Sheet 4, Item 44) on fuel filter (Figure 1, Sheet 4, Item 45) and 45 degree adapter (Figure 1, Sheet 4, Item 42) on fuel cooler (Figure 1, Sheet 4, Item 43). Connect hose (Figure 1, Sheet 4, Item 41) to 90 degree elbow (Figure 1, Sheet 4, Item 44) and to 45 degree adapter (Figure 1, Sheet 4, Item 42).

INSTALLATION - Continued

4. If necessary, install lower front panel (Figure 1, Sheet 3, Item 40) using 7 washers(Figure 1, Sheet 3, Item 39), lockwashers (Figure 1, Sheet 3, Item 38), and bolts (Figure 1, Sheet 3, Item 37).

5. If necessary, install upper front panel (Figure 1, Sheet 3, Item 36) using 13 washers (Figure 1, Sheet 3, Item 35, lockwashers (Figure 1, Sheet 3, Item 34, and bolts (Figure 1, Sheet 3, Item 33).

6. If removed, install adapter (Figure 1, Sheet 2, Item 31) and 90 degree elbow (Figure 1, Sheet 2, Item 32) on fuel tank (Figure 1, Sheet 1, Item 13). If removed, install 90 degree elbow (Figure 1, Sheet 2, Item 30) on fuel solenoid valve (Figure 1, Sheet 2, Item 28). If removed, install 90 degree elbow (Figure 1, Sheet 2, Item 27) and 90 degree elbow (Figure 1, Sheet 2, Item 26). Connect hose (Figure 1, Sheet 2, Item 25) to 90 degree elbow (Figure 1, Sheet 2, Item 27) on fuel solenoid valve (Figure 1, Sheet 2, Item 28) and 90 degree elbow (Figure 1, Sheet 2, Item 26) on auxiliary fuel pump (Figure 1, Sheet 2, Item 24).

7. If removed, install 90 degree elbow (Figure 1, Sheet 2, Item 23) on auxiliary fuel pump (Figure 1, Sheet 2, Item 24). Connect hose (Figure 1, Sheet 1, Item 20) to 90 degree elbow (Figure 1, Sheet 2, Item 23) and to 90 degree bulkhead elbow (Figure 1, Sheet 1, Item 21) on fuel fill pocket (Figure 1, Sheet 1, Item 22).

8. If removed, install radiator (WP 0068).

9. Install washer (Figure 1, Sheet 2, Item 19), seal nut (Figure 1, Sheet 2, Item 18), nipple (Figure 1, Sheet 2, Item 17), elbow fitting (Figure 1, Sheet 2, Item 16), and 90 degree male fitting (Figure 1, Sheet 2, Item 14) on rear of fuel tank filler neck (Figure 1, Sheet 2, Item 15).

10. If removed, install elbow (Figure 1, Sheet 1, Item 12) to right side of fuel tank (Figure 1, Sheet 1, Item 13). Connect hose (Figure 1, Sheet 1, Item 11) to 90 degree male fitting (Figure 1, Sheet 2, Item 14) at rear of fuel tank filler neck (Figure 1, Sheet 2, Item 15) and to elbow (Figure 1, Sheet 1, Item 12). Install two hose clamps.

11. Install water separator filter drain (Figure 1, Sheet 1, Item 1) onto water separator filter (Figure 1, Sheet 1, Item 3).

12. Install hose (Figure 1, Sheet 1, Item 8) onto water separator filter drain (Figure 1, Sheet 1, Item 1) using clamp (Figure 1, Sheet 1, Item 7).

13. Install swivel ball fitting (Figure 1, Sheet 1, Item 6) onto hose (Figure 1, Sheet 1, Item 8) using clamp (Figure 1, Sheet 1, Item 7).

14. Install female connector (Figure 1, Sheet 1, Item 9) onto swivel ball fitting (Figure 1, Sheet 1, Item 6).

15. Install hose (Figure 1, Sheet 1, Item 10) onto female connector (Figure 1, Sheet 1, Item 9) using clamp (Figure 1, Sheet 1, Item 7).

16. Install hose assembly (Figure 1, Sheet 1, Item 4) onto fuel pickup tube assembly (Figure 1, Sheet 1, Item 5) and water separator filter (Figure 1, Sheet 1, Item 3).

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

FUEL PICKUP TUBE ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Personnel Required

One

Materials/Parts

Cap and plug set (WP 0124, Item 6)
Gasket
Sealing compound (WP 0124, Item 40)

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the fuel system.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.
2. Open left rear doors.
3. Disconnect hose (Figure 1, Item 1) from fuel pickup tube (Figure 1, Item 2).

REMOVAL - Continued

4. Remove five screws (Figure 1, Item 3), lockwashers (Figure 1, Item 4), washers (Figure 1, Item 5), fuel pickup tube (Figure 1, Item 2), and gasket (Figure 1, Item 6).

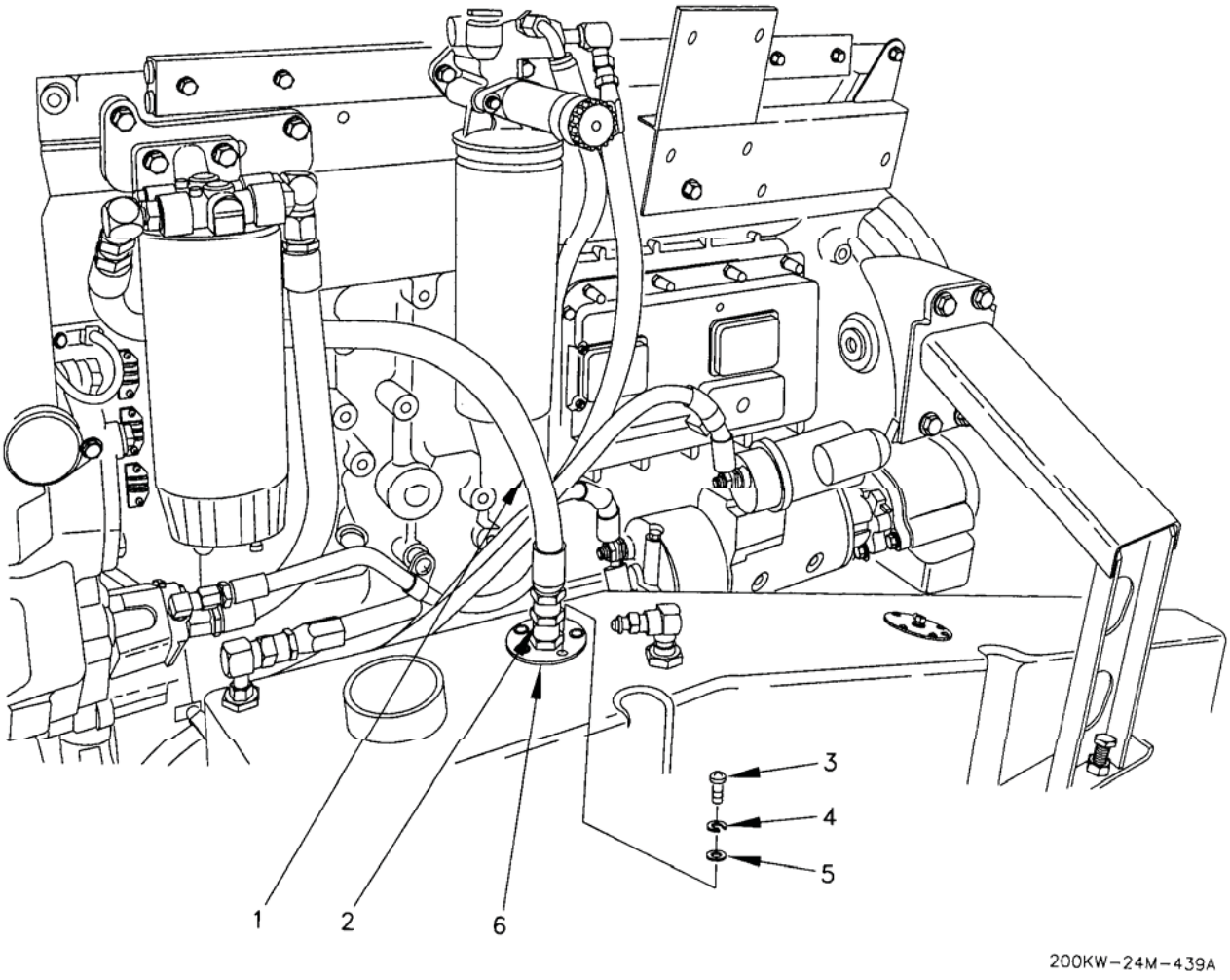

Figure 1. Fuel Pickup Tube Assembly.

END OF TASK

INSTALLATION

1. Clean area on fuel tank where gasket (Figure 1, Item 6) will be installed.
2. Apply sealing compound to both sides of gasket (Figure 1, Item 6), and install gasket, fuel pickup tube (Figure 1, Item 2), five washers (Figure 1, Item 5), lockwashers (Figure 1, Item 4), and screws (Figure 1, Item 3).
3. Connect hose (Figure 1, Item 1) to fuel pickup tube (Figure 1, Item 2).
4. Close left rear doors.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

AUXILIARY FUEL PUMP ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic s (WP 0123, Item 1)

Personnel Required

Two

Materials/Parts

Cap and plug set (WP 0124, Item 6)
Fuel (WP 0124, Item 16, 17, 51, or 52)
Gasket
Marker tags (WP 0124, Item 49)
Sealing compound (WP 0124, Item 37)
Tiedown straps (WP 0124, Item 47)

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the fuel system.

SERVICING (Part No. 0116-1320 Only)

NOTE

Servicing can be performed without removing auxiliary fuel pump.

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.
2. Open left front doors and left rear doors.
3. Remove three screws (Figure 1, Item 1), cover (Figure 1, Item 2), gasket (Figure 1, Item 3), and strainer (Figure 1, Item 4) from auxiliary fuel pump (Figure 1, Item 5).
4. Clean strainer (Figure 1, Item 4) with clean fuel. Replace strainer if damaged.
5. Install strainer (Figure 1, Item 4), gasket (Figure 1, Item 3), cover (Figure 1, Item 2), and three screws (Figure 1, Item 1).

END OF TASK

SERVICING (Part No. 0116-1333 Only)

NOTE

Servicing can be performed without removing auxiliary fuel pump.

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding
2. Open left front doors, and left rear doors.
3. Remove bowl screw (Figure 1, Item 1) that secures fuel bowl (Figure 1, Item 2) to auxiliary fuel pump (Figure 1, Item 5).
4. Remove fuel bowl (Figure 1, Item 2), O-ring (Figure 1, Item 3), and strainer (Figure 1, Item 4) from auxiliary fuel pump (Figure 1, Item 5).
5. Clean strainer (Figure 1, Item 4) with clean fuel. Replace strainer if damaged.
6. Install strainer (Figure 1, Item 4), O-ring (Figure 1, Item 3), and fuel bowl (Figure 1, Item 2) on auxiliary fuel pump (Figure 1, Item 5) and secure with bowl screw (Figure 1, Item 1).

END OF TASK

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.
2. Open left front doors and left rear doors.

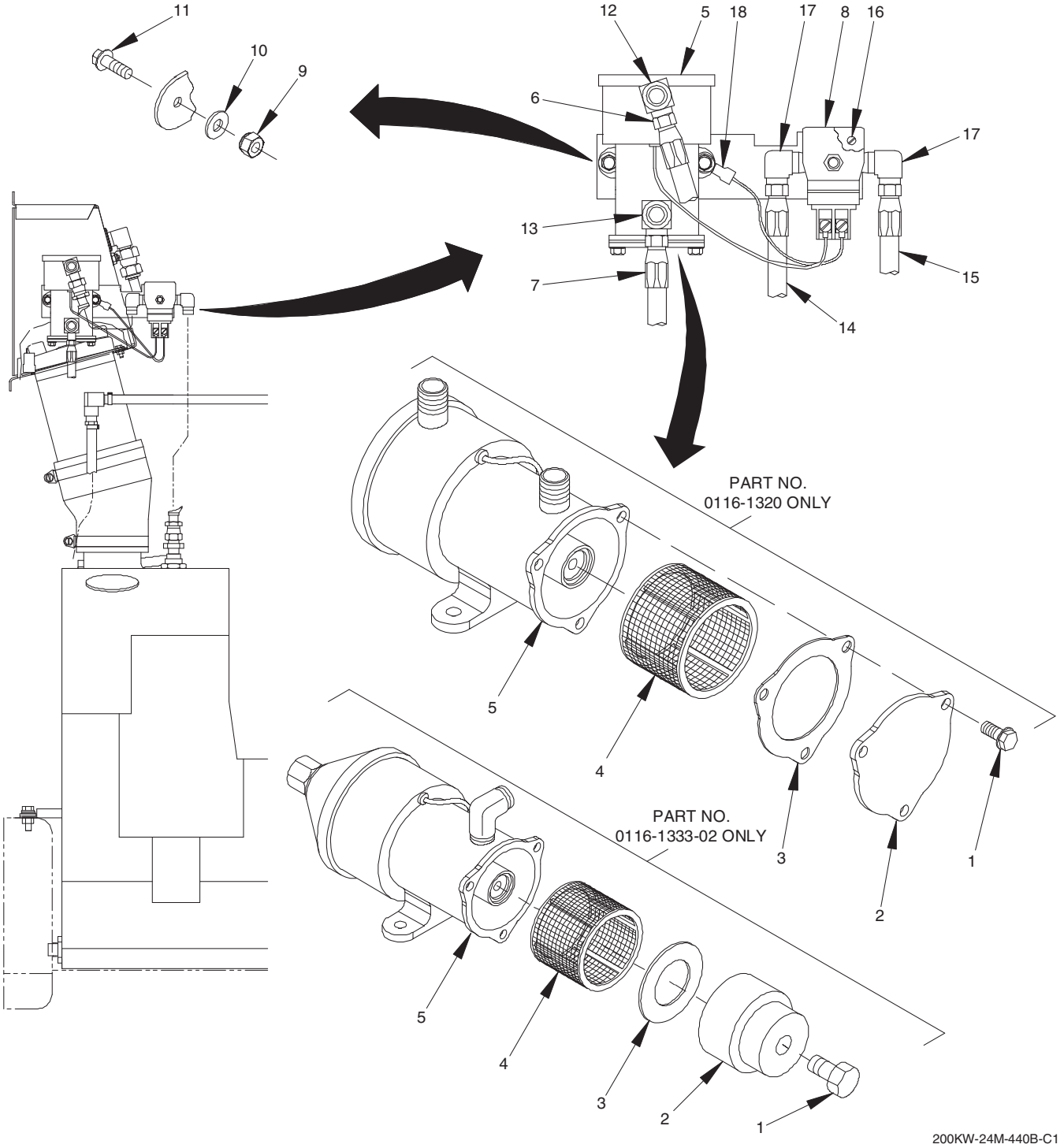

Figure 1. Auxiliary Fuel Pump Assembly.

REMOVAL - Continued

NOTE

Cut tiedown straps as required.

3. Disconnect hose (Figure 1, Item 6) and hose (Figure 1, Item 7) from auxiliary fuel pump (Figure 1, Item 5).
4. Tag and disconnect wires coming from solenoid valve (Figure 1, Item 8).
5. Remove two locknuts (Figure 1, Item 9), washers (Figure 1, Item 10), screws (Figure 1, Item 11), and auxiliary fuel pump (Figure 1, Item 5).
6. If necessary, remove elbow (Figure 1, Item 12) and elbow (Figure 1, Item 13).
7. Disconnect two hoses (Figure 1, Item 14) and (Figure 1, Item 15) from solenoid valve (Figure 1, Item 8).
8. Remove two screws (Figure 1, Item 16) and solenoid valve (Figure 1, Item 8).
9. If necessary, remove two elbows (Figure 1, Item 17).

END OF TASK

INSTALLATION

NOTE

Apply sealing compound to all male pipe threads before connecting.

1. If removed, install two elbows (Figure 1, Item 17).
2. Install solenoid valve (Figure 1, Item 8) and two screws (Figure 1, Item 16).
3. Connect two hoses (Figure 1, Item 15) and (Figure 1, Item 14) to solenoid valve (Figure 1, Item 8).
4. If removed, install two elbows (Figure 1, Item 13) and (Figure 1, Item 12) to auxiliary fuel pump (Figure 1, Item 5).
5. Making sure ground lug (Figure 1, Item 18) is positioned between screw (Figure 1, Item 11) and washer (Figure 1, Item 10), install auxiliary fuel pump (Figure 1, Item 5), two screws (Figure 1, Item 11), washers (Figure 1, Item 10), and locknuts (Figure 1, Item 9).

NOTE

Install tiedown straps as required.

6. Remove tags and connect wires to solenoid valve (Figure 1, Item 8).
7. Connect hose (Figure 1, Item 7) and hose (Figure 1, Item 6).
8. Close left rear doors and left front door.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

FUEL COOLER MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

References

TM 9-6115-730-24P

Materials/Parts

Cap and plug set (WP 0124, Item 6)

Personnel Required

One

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

WARNING

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the fuel system.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Open left rear door assemblies.

3. Open right rear door assemblies.

4. Remove twenty screws (Figure 1, Sheet 1, Item 1), lockwashers (Figure 1, Sheet 1, Item 2), washers (Figure 1, Sheet 1, Item 3), and horizontal upper front base baffles (Figure 1, Sheet 1, Item 4 and Item 5).

5. Remove twelve screws (Figure 1, Sheet 2, Item 6), lockwashers (Figure 1, Sheet 2, Item 7), washers (Figure 1, Sheet 1, Item 8), and horizontal lower front base baffles (Figure 1, Sheet 2, Item 9 and Item 10).

NOTE

Fuel will drain from fuel hoses when hoses are disconnected. Keep hoses elevated to minimize fuel drainage.

6. Disconnect fuel hoses (Figure 1, Sheet 2, Item 11 and Item 12), from fuel cooler (Figure 1, Sheet 2, Item 13)

7. Remove four screws (Figure 1, Sheet 2, Item 14), eight washers (Figure 1, Sheet 2, Item 15), and four bushings (Figure 1, Sheet 2, Item 16).

8. Remove fuel cooler (Figure 1, Sheet 2, Item 13).

END OF TASK

INSTALLATION

1. Install fuel cooler (Figure 1, Sheet 2, Item 13) with four bushings (Figure 1, Sheet 2, Item 16), eight washers (Figure 1, Sheet 2, Item 15), and four screws (Figure 1, Sheet 2, Item 14).

2. Connect fuel hoses (Figure 1, Sheet 2, Item 12 and Item 11) onto fuel cooler (Figure 1, Sheet 2, Item 13).

3. Install horizontal lower front base baffles (Figure 1, Sheet 2, Item 10 and Item 9) with twelve washers (Figure 1, Sheet 2, Item 8), lockwashers (Figure 1, Sheet 2, Item 7), and screws (Figure 1, Sheet 2, Item 6).

4. Install horizontal upper front base baffles (Figure 1, Sheet 1, Item 5 and Item 4) with twenty washers (Figure 1, Sheet 1, Item 3), lockwashers (Figure 1, Sheet 1, Item 2), and screws (Figure 1, Sheet 1, Item 1).

5. Close right rear door assemblies.

6. Close left rear door assemblies.

INSTALLATION - Continued

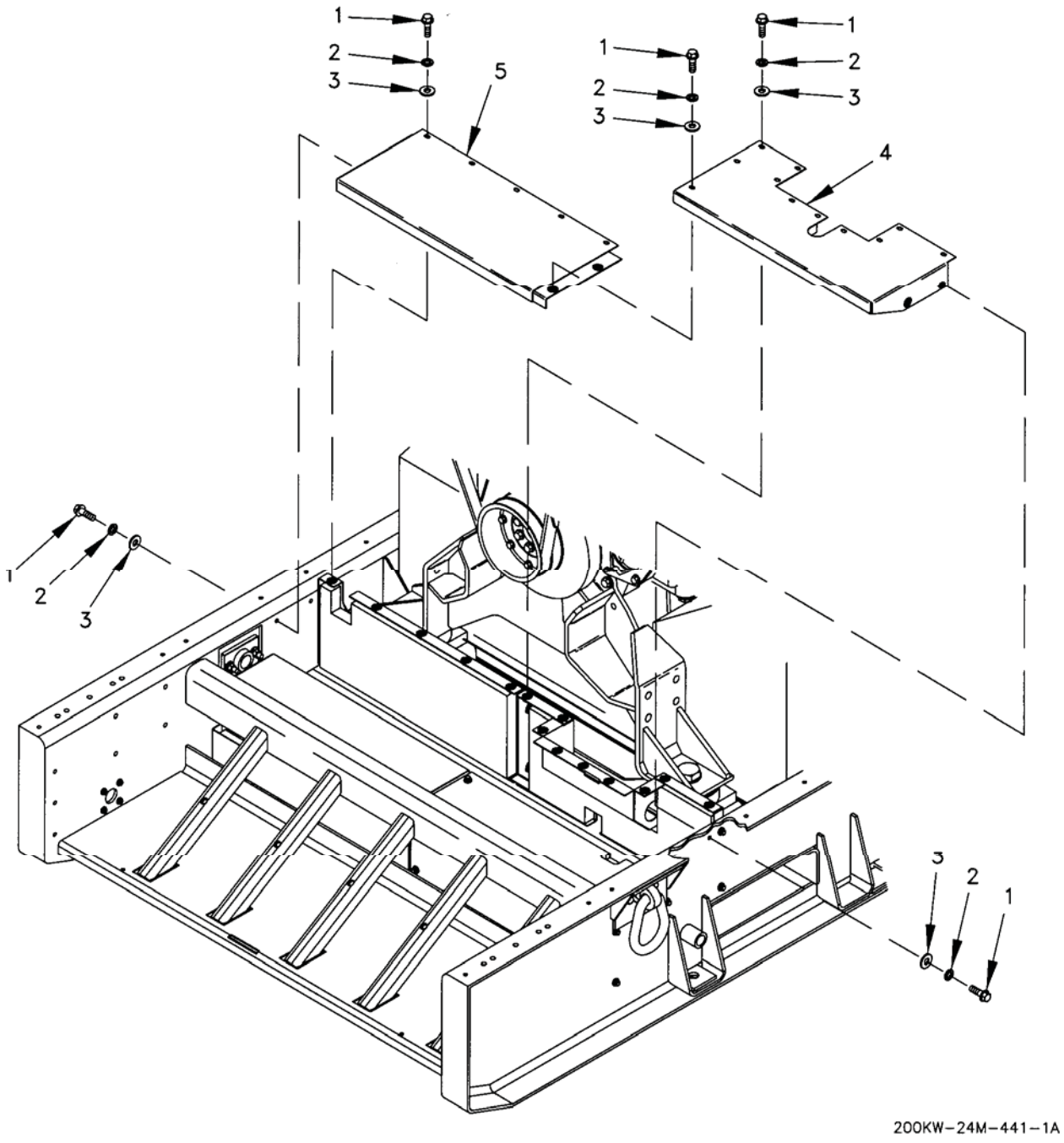

Figure 1. Fuel Cooler (Sheet 1 of 2).

INSTALLATION - Continued

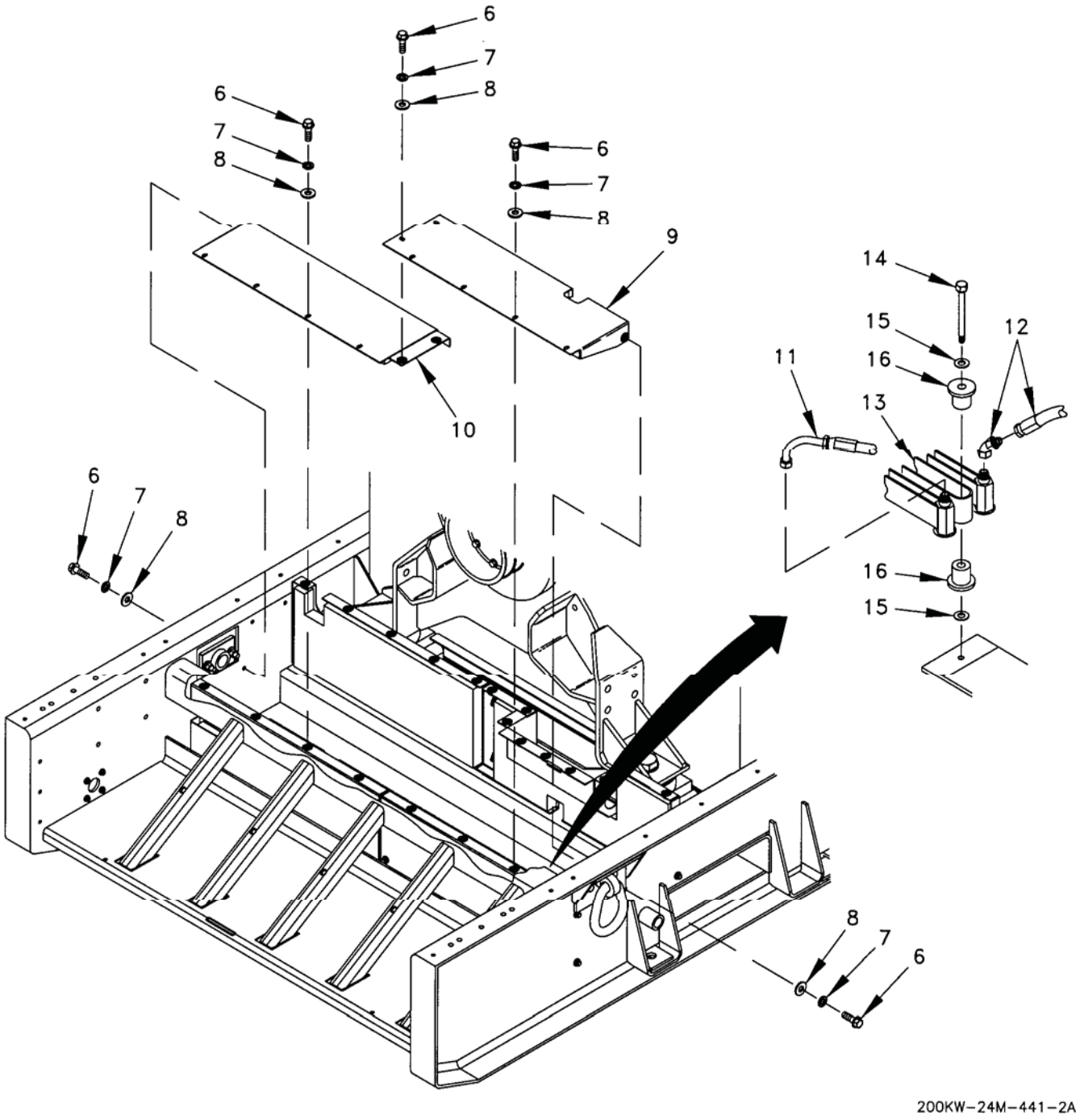

Figure 1. Fuel Cooler (Sheet 2 of 2).

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

WATER SEPARATOR FILTER AND BRACKET MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Personnel Required

One

Materials/Parts

Cap and plug set (WP 0124, Item 6)
Filter
Gasket
Sealant (WP 0124, Item 37)
Tiedown strap (WP 0124, Item 46)

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the fuel system. Ensure fuel pan is available to drain excess fuel from hose and water separator assembly.

DRAINING

1. Open left front door.
2. Rotate valve (Figure 1, Item 1) and air vent (Figure 1, Item 2) to allow water to drain from bowl (Figure 1, Item 3).
3. Rotate valve (Figure 1, Item 1) and air vent (Figure 1, Item 2) to close.
4. Close left front door.

END OF TASK

WATER SEPARATOR FILTER ASSEMBLY REPLACEMENT

1. Open left front door.
2. Remove clamp (Figure 1, Item 4) and disconnect hose (Figure 1, Item 5) from drain port on bottom of water separator filter bowl (Figure 1, Item 3).
3. Remove water separator filter assembly (Figure 1, Item 7)
4. Install new filter element (Figure 1, Item 8) into water separator assembly (Figure 1, Item 7). Install new water separator filter assembly.
5. Connect hose (Figure 1, Item 5) to bottom of bowl (Figure 1, Item 3) and install clamp (Figure 1, Item 4).
6. Close left front doors.

END OF TASK

WATER SEPARATOR FILTER REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.
2. Open left front doors.

NOTE

Cut tiedown straps as required.

3. Remove clamp (Figure 1, Item 4) and disconnect hose (Figure 1, Item 5) from drain port on bottom of water separator filter bowl (Figure 1, Item 3).
4. Disconnect hose (Figure 1, Item 9) and hose (Figure 1, Item 10) from water separator filter assembly (Figure 1, Item 7).

WATER SEPARATOR FILTER REMOVAL - Continued

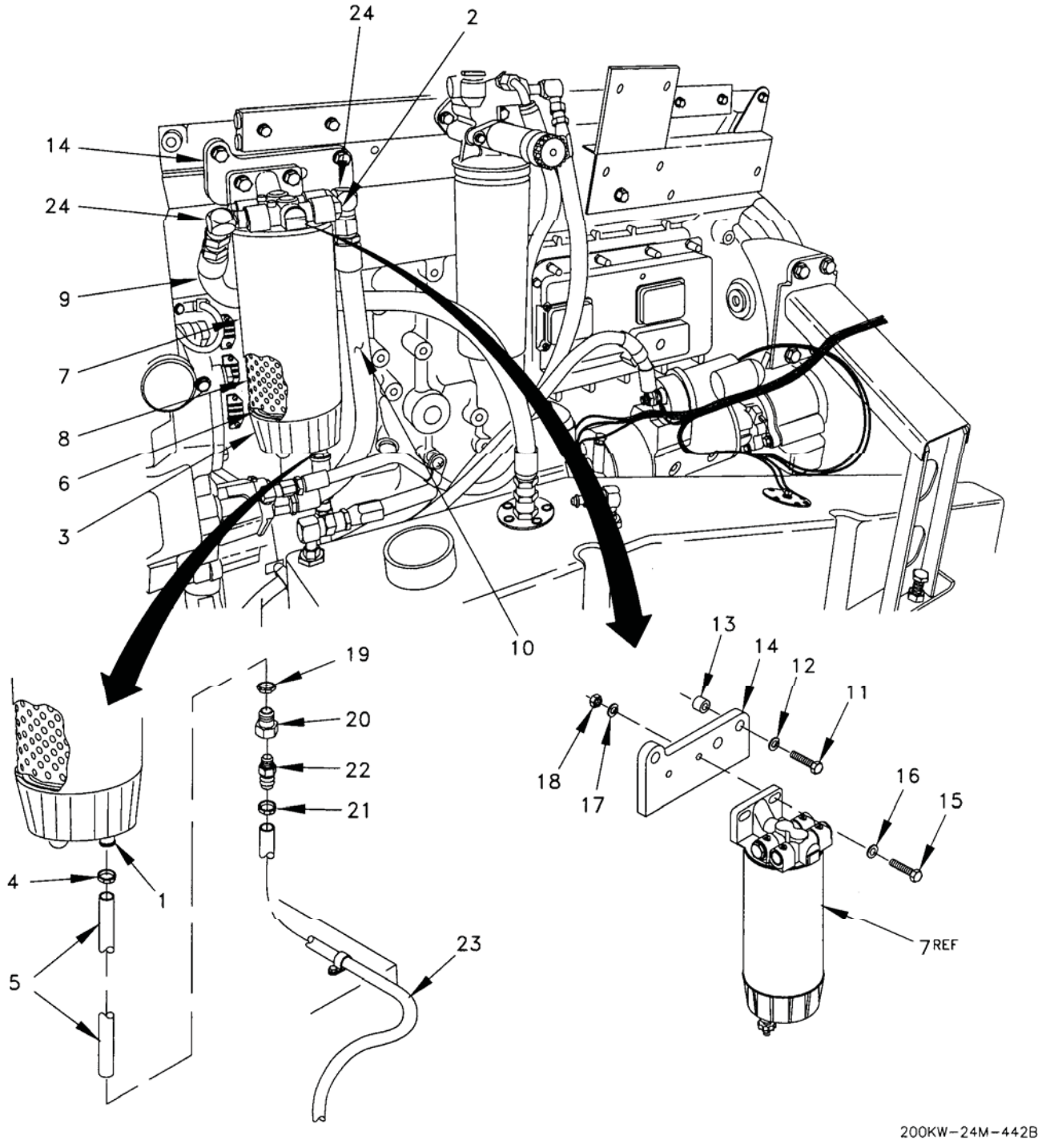

Figure 1. Water Separator Filter and Bracket.

WATER SEPARATOR FILTER REMOVAL - Continued

5. Remove two screws (Figure 1, Item 11), lockwashers (Figure 1, Item 12), spacers (Figure 1, Item 13), and water separator filter assembly (Figure 1, Item 7) with bracket (Figure 1, Item 14).

6. Remove two screws (Figure 1, Item 15), washers (Figure 1, Item 16), lockwashers (Figure 1, Item 17), nuts (Figure 1, Item 18), and bracket (Figure 1, Item 14).

7. Remove clamp (Figure 1, Item 19), swivel (Figure 1, Item 20), clamp (Figure 1, Item 21), and hose barb (Figure 1, Item 22) from hose (Figure 1, Item 23).

8. If necessary, remove two elbows (Figure 1, Item 24).

END OF TASK

WATER SEPARATOR FILTER INSTALLATION

NOTE

Install tiedown straps as required.

1. Apply sealant to male threads and install two elbows (Figure 1, Item 24) on water separator filter assembly (Figure 1, Item 7).

2. Install hose barb (Figure 1, Item 22) on hose (Figure 1, Item 23) with clamp (Figure 1, Item 21), swivel (Figure 1, Item 20), and clamp (Figure 1, Item 19).

3. Install water separator filter assembly (Figure 1, Item 7) onto bracket (Figure 1, Item 14), and secure with two nuts (Figure 1, Item 18), lockwashers (Figure 1, Item 17), washers (Figure 1, Item 16), and screws (Figure 1, Item 15).

4. Install bracket (Figure 1, Item 14) with water separator filter assembly (Figure 1, Item 7), two spacers (Figure 1, Item 13), lockwashers (Figure 1, Item 12), and screws (Figure 1, Item 11).

5. Connect hose (Figure 1, Item 10) and hose (Figure 1, Item 9) to water separator filter assembly (Figure 1, Item 7).

6. Connect hose (Figure 1, Item 5) to drain port on bottom of water separator filter bowl (Figure 1, Item 3) and install clamp (Figure 1, Item 4).

7. Close left front door.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
FUEL LEVEL SENDER MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)
Multimeter

Materials/Parts

Cap and plug set (WP 0124, Item 6)
Gasket
Sealant (WP 0124, Item 40)
Tiedown straps (WP 0124, Item 48)

Personnel Required

Two

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the fuel system.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Open left rear doors.

NOTE

Cut tiedown straps as required.

3. Tag and disconnect wires from fuel level sender (Figure 1, Sheet 1, Item 1).

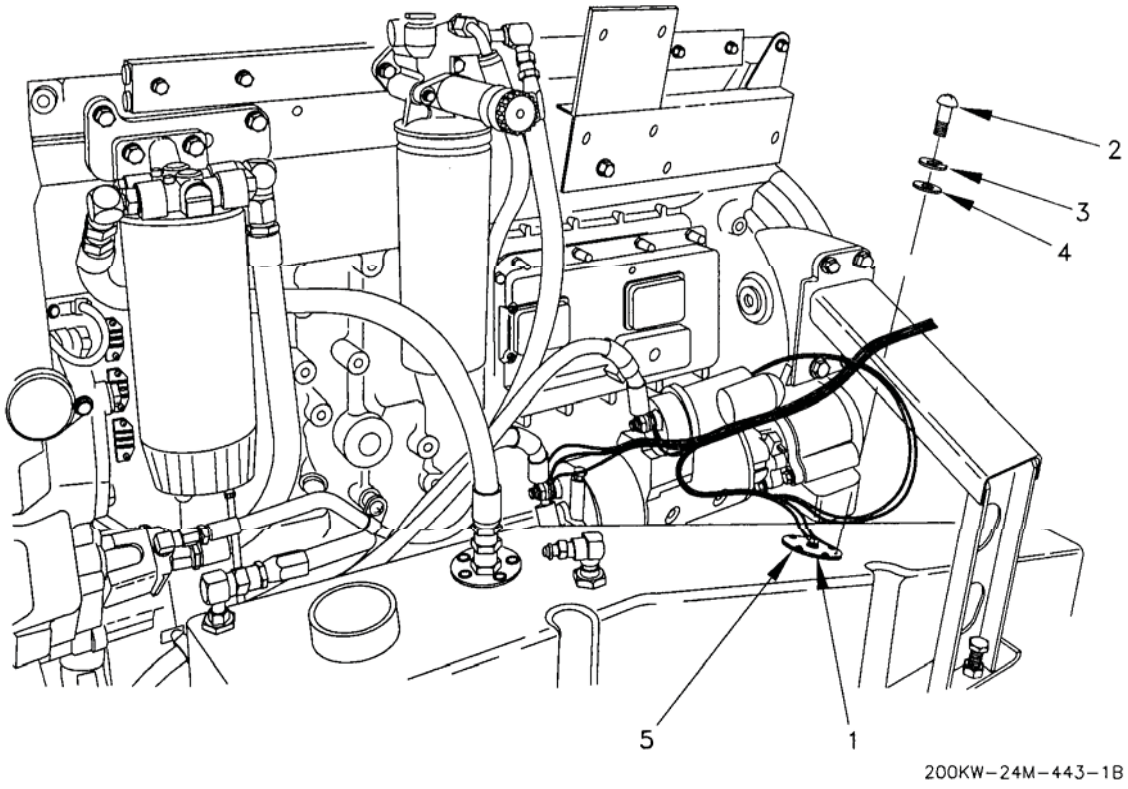

Figure 1. Fuel Level Sender (Sheet 1 of 2).

REMOVAL - Continued

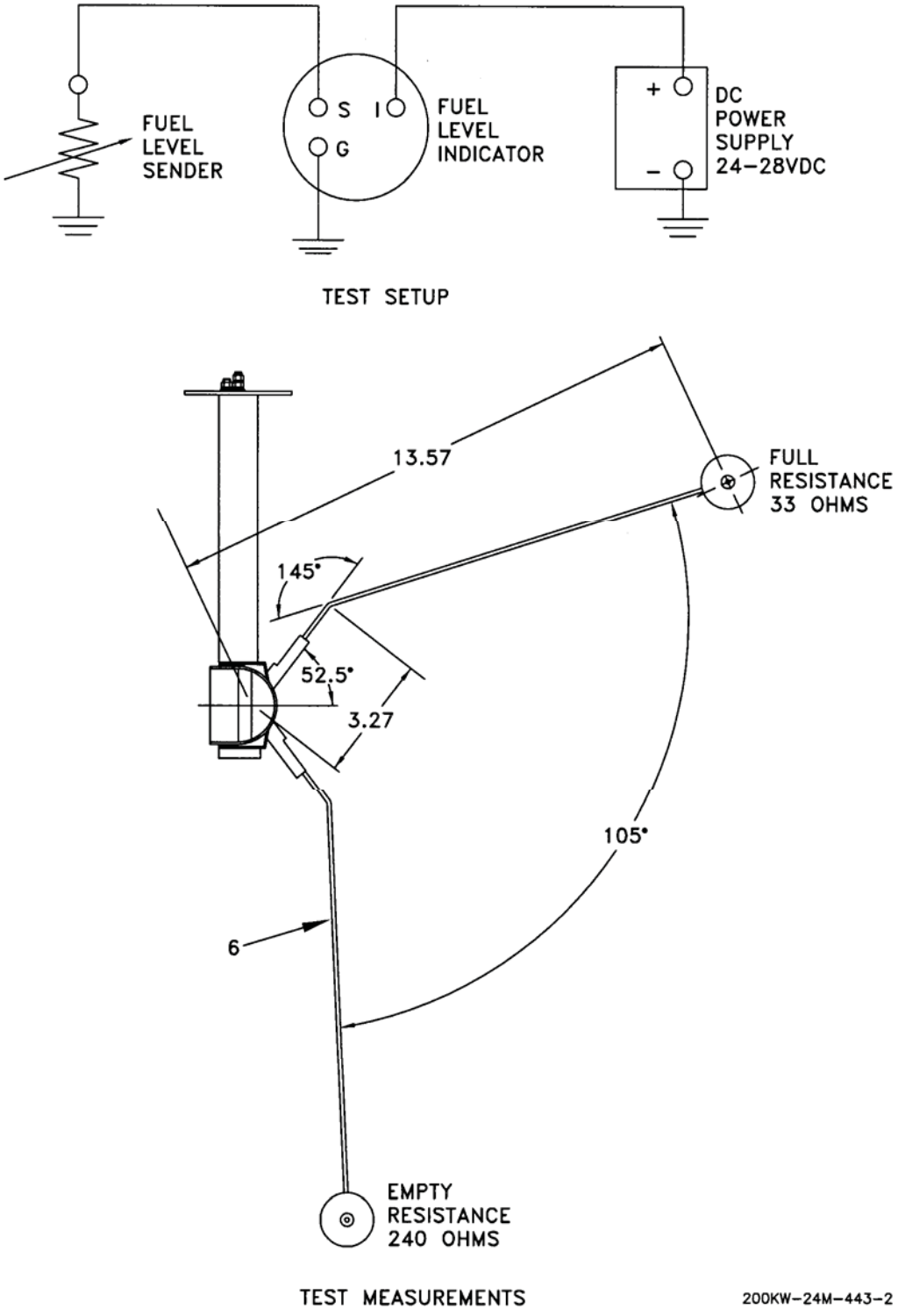

Figure 1. Fuel Level Sender (Sheet 2 of 2).

REMOVAL - Continued

CAUTION

Note orientation of sender assembly to ensure correct installation.

4. Remove five screws (Figure 1, Sheet 1, Item 2), lockwashers (Figure 1, Sheet 1, Item 3), washers (Figure 1, Sheet 1, Item 4), fuel level sender assembly (Figure 1, Sheet 1, Item 1), and gasket (Figure 1, Sheet 1, Item 5).

END OF TASK

TEST AND INSPECTION

1. Remove five screws, lockwashers and fuel level sender assembly from fuel tank.
2. Set Battery Disconnect Switch to ON.
3. Set DEAD CRANK SWITCH to NORMAL.
4. Set Engine Control Switch to COOL DOWN/STOP.
5. Hold fuel level sender (Figure 1, Sheet 1, Item 1) in vertical position with armature (Figure 1, Sheet 2, Item 6) hanging down. Fuel level indicator should read “E” +/- 1/8 inch.
6. Raise armature (Figure 1, Sheet 2, Item 6) to full up position. Fuel level indicator should read “F” +/- 1/8 inch.
7. Check resistance in “Full” and “Empty” positions according to Figure 1, Sheet 2.
8. If resistance measurements are incorrect, replace fuel level sender.
9. If resistance measurements are correct, verify the wiring per FO-1, Sheet 2 and FO-3, Sheet 1.
10. If the wiring is correct, replace fuel indicator.

END OF TASK

INSTALLATION

1. Clean area on fuel tank where gasket (Figure 1, Sheet 1, Item 5) is to be installed.

CAUTION

Install sender as marked or incorrect fuel level indications will result.

2. Apply sealing compound to both sides of gasket (Figure 1, Sheet 1, Item 5) and install gasket, fuel level sender assembly (Figure 1, Sheet 1, Item 1), five washers (Figure 1, Sheet 1, Item 4), lockwashers (Figure 1, Sheet 1, Item 3), and screws (Figure 1, Sheet 1, Item 2).

NOTE

Install tiedown straps as required.

3. Remove tags and connect wires from fuel level sender (Figure 1, Sheet 1, Item 1).

4. Close left rear doors.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
FUEL TANK MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Materials/Parts

Repair kit, adhesive (WP 0124, Item 36)

References

TM 9-6115-730-10
TM 9-6115-730-24P

Personnel Required

One

Equipment Condition

Front roof housing assembly removed (WP 0030)
Rear roof housing assembly removed (WP 0031)

Equipment Condition (cont.)

Engine-generator compartment ceiling assembly removed (WP 0032)
Front section housing assembly removed (WP 0034)
Rear Section Housing assembly removed (WP 0035)
Left center panel assembly removed (WP 0036)
Right center panel assembly removed (WP 0037)
Fuel drain valve and piping removed (WP 0057)
Auxiliary fuel pump removed (WP 0059)
Engine removed (WP 0096)
Fuel level switch assembly removed (WP 0056)
Fuel pickup tube assembly removed (WP 0058)
Fuel level sender removed (WP 0062)
Fuel filler inlet disconnected (WP 0057)
Fuel hoses and fittings removed (WP 0057)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the fuel system.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Remove four screws (Figure 1, item 1), four nuts (Figure 1, item 2), washers (Figure 1, item 3) two hold down assemblies (Figure 1, item 4), and fuel tank (Figure 1, item 5).

END OF TASK

REPAIR

Repair damage to fuel tank with adhesive repair kit, following directions provided with the kit.

END OF TASK

INSTALLATION

1. Install fuel tank (Figure 1, item 5), two hold down assemblies (Figure 1, item 4), four screws (Figure 1, item 1), washers (Figure 1, item 3), and nuts (Figure 1, item 2).

2. Install fuel drain valve and piping (WP 0057).

3. Install fuel hoses and fittings (WP 0057).

4. Connect fuel filler inlet (WP 0057).

5. Install fuel level sender (WP 0062).

6. Install fuel pickup tube (WP 0058).

7. Install fuel level switch assembly (WP 0056).

8. Install engine (WP 0096).

INSTALLATION - Continued

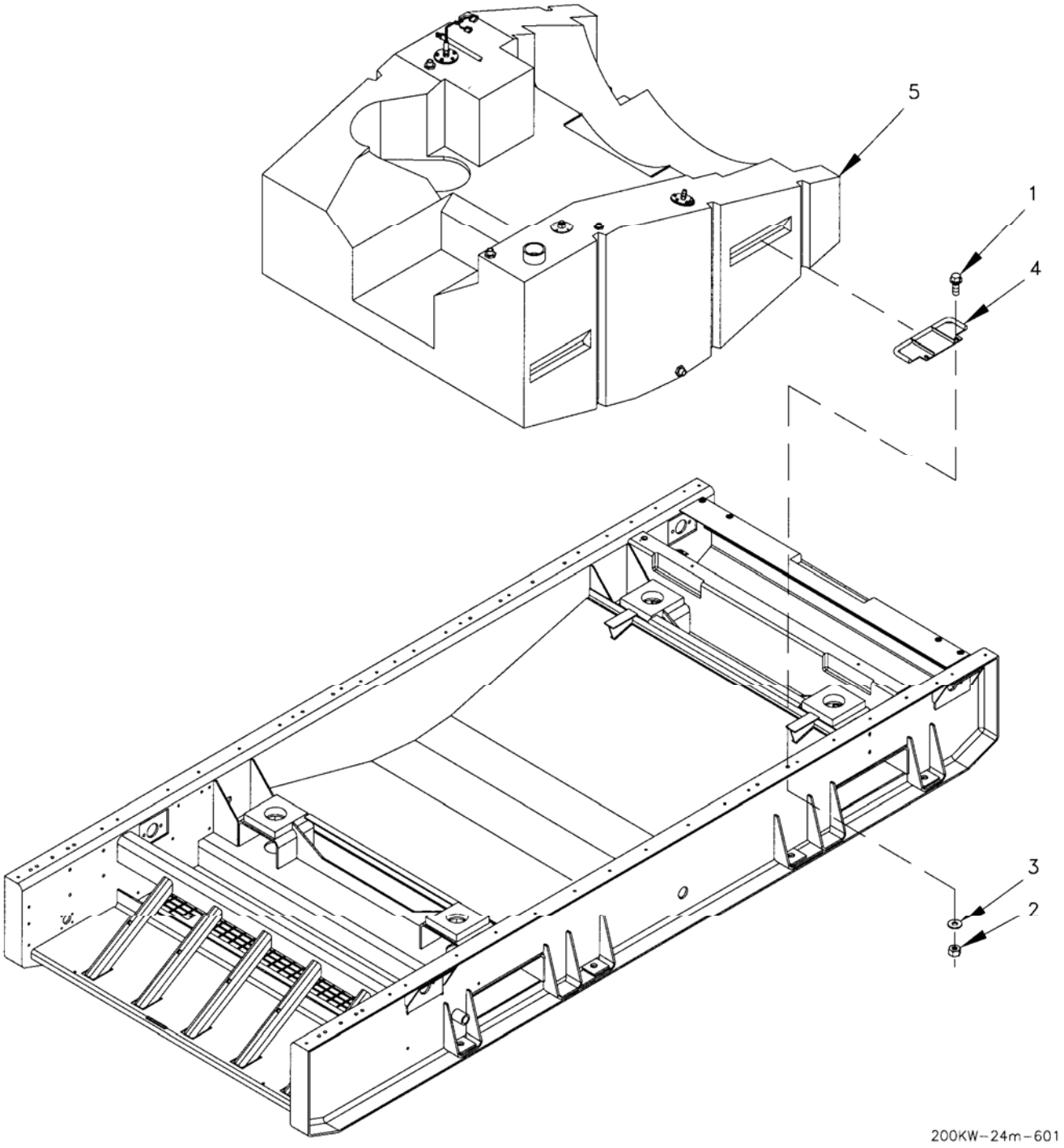

Figure 1. Fuel Tank Maintenance.

INSTALLATION - Continued

9. Install auxiliary fuel pump (WP 0059).
10. Install Engine-generator Compartment Ceiling Assembly (WP 0032).
11. Install Front Section Housing Assembly (WP 0034).
12. Install Front Roof Housing Assembly (WP 0030).
13. Install Rear Section Housing Assembly (WP 0035).
14. Install Rear Roof Housing Assembly (WP 0031).
15. Install Left Center Panel Assembly (WP 0036).
16. Install Right Center Panel Assembly (WP 0037).
17. Service fuel tank (TM 9-6115-730-10).

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
COOLANT RECOVERY SYSTEM MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Tool Kit, General Mechanic's (WP 0123, Item 1)

Materials/Parts

Antifreeze (WP 0124, Item 5)
Cap and plug set (WP 0124, Item 6)

Personnel Required

One

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/ or liquids can result in burns and scalding. Shut down generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the coolant system.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Open right rear doors.

3. Place container under coolant recovery system bottle (Figure 1, Item 1).

4. Remove two hose clamps (Figure 1, Item 2) securing hoses (Figure 1, Item 3) and (Figure 1, Item 4) to coolant recovery system bottle (Figure 1, Item 1) and disconnect two hoses.

5. Drain coolant into suitable container until coolant recovery system is empty. Retain coolant for refilling cooling system.

6. Remove two screws (Figure 1, Item 5), washers (Figure 1, Item 6), lockwashers (Figure 1, Item 7), and coolant recovery system bottle (Figure 1, Item 1).

END OF TASK

INSTALLATION

1. Install coolant recovery system bottle (Figure 1, Item 1), two washers (Figure 1, Item 7), lockwashers (Figure 1, Item 6), and screws (Figure 1, Item 5).

2. Connect two hoses (Figure 1, Item 3) and (Figure 1, Item 4) to coolant recovery system bottle (Figure 1, Item 1) and secure with two hose clamps (Figure 1, Item 2).

3. Pour coolant into coolant recovery system bottle (Figure 1, Item 1). If necessary, add coolant so level is between HOT and COLD marks on bottle.

4. Close right rear doors.

INSTALLATION - Continued

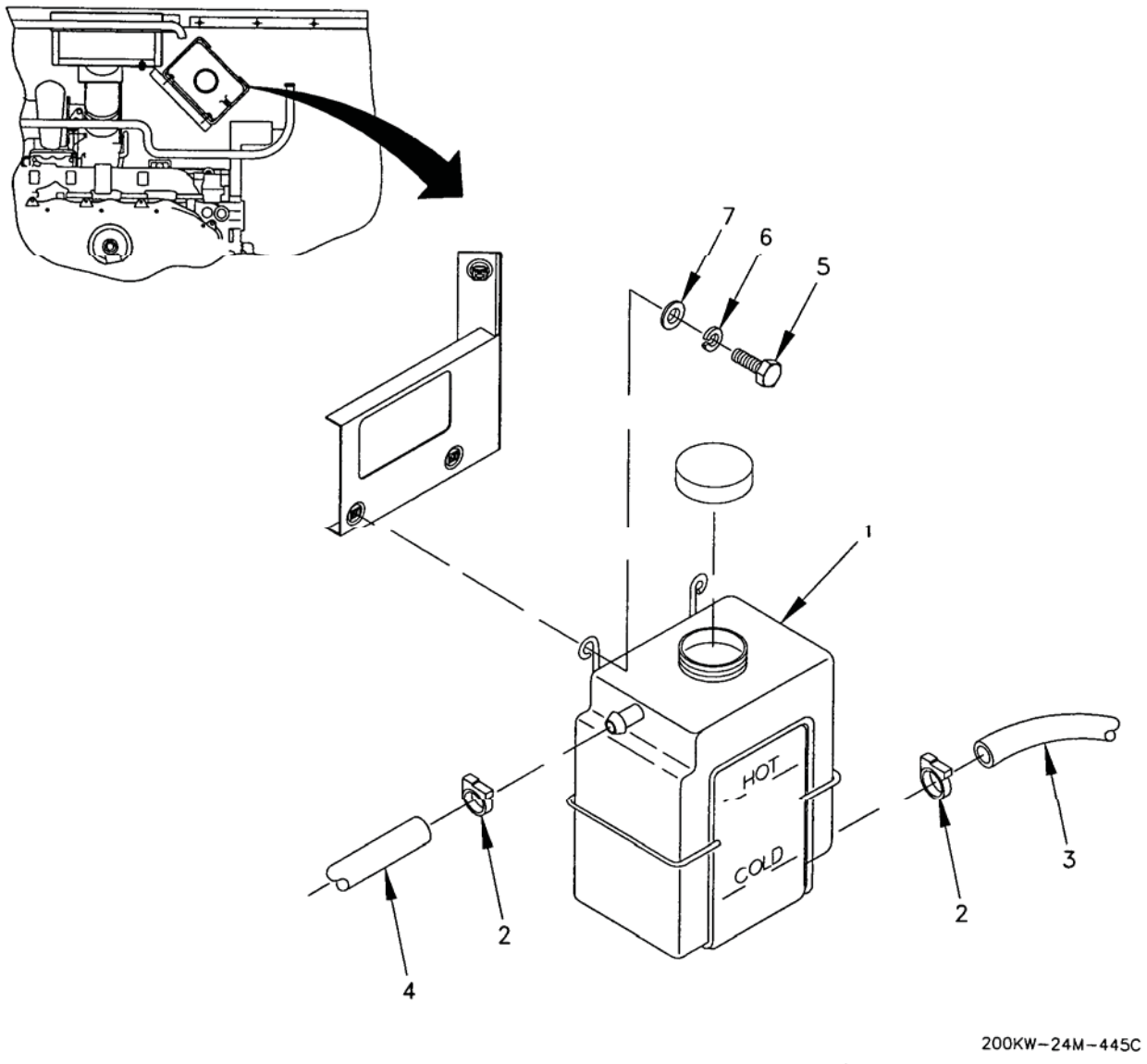

Figure 1. Coolant Recovery System.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
SURGE TANK MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Tool Kit, General Mechanic's (WP 0123, Item 1)

Materials/Parts

Cap and plug set (WP 0124, Item 6)
Marker tags (WP 0124, Item 49)
Sealant (WP 0124, Item 37)

Personnel Required

One

References

TM 9-6115-730-24P

Equipment Condition

Right side access cover removed (WP 0029)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/ or liquids can result in burns and scalding. Shut down generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the coolant system.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Open right rear doors and right front doors.

3. Place container under COOLANT DRAIN on right side of TQG.

4. Remove coolant fill cap (Figure 1, Item 1) and open drain valves (Figure 1, Item 2) and (Figure 1, Item 3).

5. Drain approximately two gallons of coolant into suitable container until surge tank (Figure 1, Item 4) is empty. Retain coolant for refilling cooling system.

6. Remove hose clamp (Figure 1, Item 5) and disconnect hose (Figure 1, Item 6) from bottom of surge tank (Figure 1, Item 4).

7. Remove coolant level sensor (Figure 1, Item 7) and reducer (Figure 1, Item 8) from surge tank (Figure 1, Item 4).

8. Loosen two hose clamps (Figure 1, Item 9) and disconnect water hose (Figure 1, Item 10) from top of surge tank (Figure 1, Item 4).

9. Remove two hose clamps and tag and disconnect two hoses (Figure 1, Item 11) and (Figure 1, Item 12) from top of surge tank (Figure 1, Item 4).

10. Remove four locknuts (Figure 1, Item 13), washers (Figure 1, Item 14), and screws (Figure 1, Item 15), and remove two lower surge tank brackets (Figure 1, Item 16) and surge tank (Figure 1, Item 4) from two upper surge tank brackets (Figure 1, Item 17).

11. Remove two screws (Figure 1, Item 18), lockwashers (Figure 1, Item 19), and washers (Figure 1, Item 20), and remove two upper surge tank brackets (Figure 1, Item 17).

END OF TASK

INSTALLATION

1. Install two upper surge tank brackets (Figure 1, Item 17) and secure with two washers (Figure 1, Item 20), lockwashers (Figure 1, Item 19), and screws (Figure 1, Item 18).

2. Install surge tank (Figure 1, Item 4) and two lower surge tank brackets (Figure 1, Item 16) and secure with four screws (Figure 1, Item 15), washers (Figure 1, Item 14), and locknuts (Figure 1, Item 13).

3. Remove tags and connect two hoses (Figure 1, Item 12) and (Figure 1, Item 11) to top of surge tank (Figure 1, Item 4).

4. Connect water hose (Figure 1, Item 10) to top of surge tank (Figure 1, Item 4) and tighten two hose clamps (Figure 1, Item 9).

5. Apply sealing compound to male threads of reducer (Figure 1, Item 8) and coolant level sensor (Figure 1, Item 7) and install reducer and coolant level sensor on surge tank (Figure 1, Item 4).

INSTALLATION - Continued

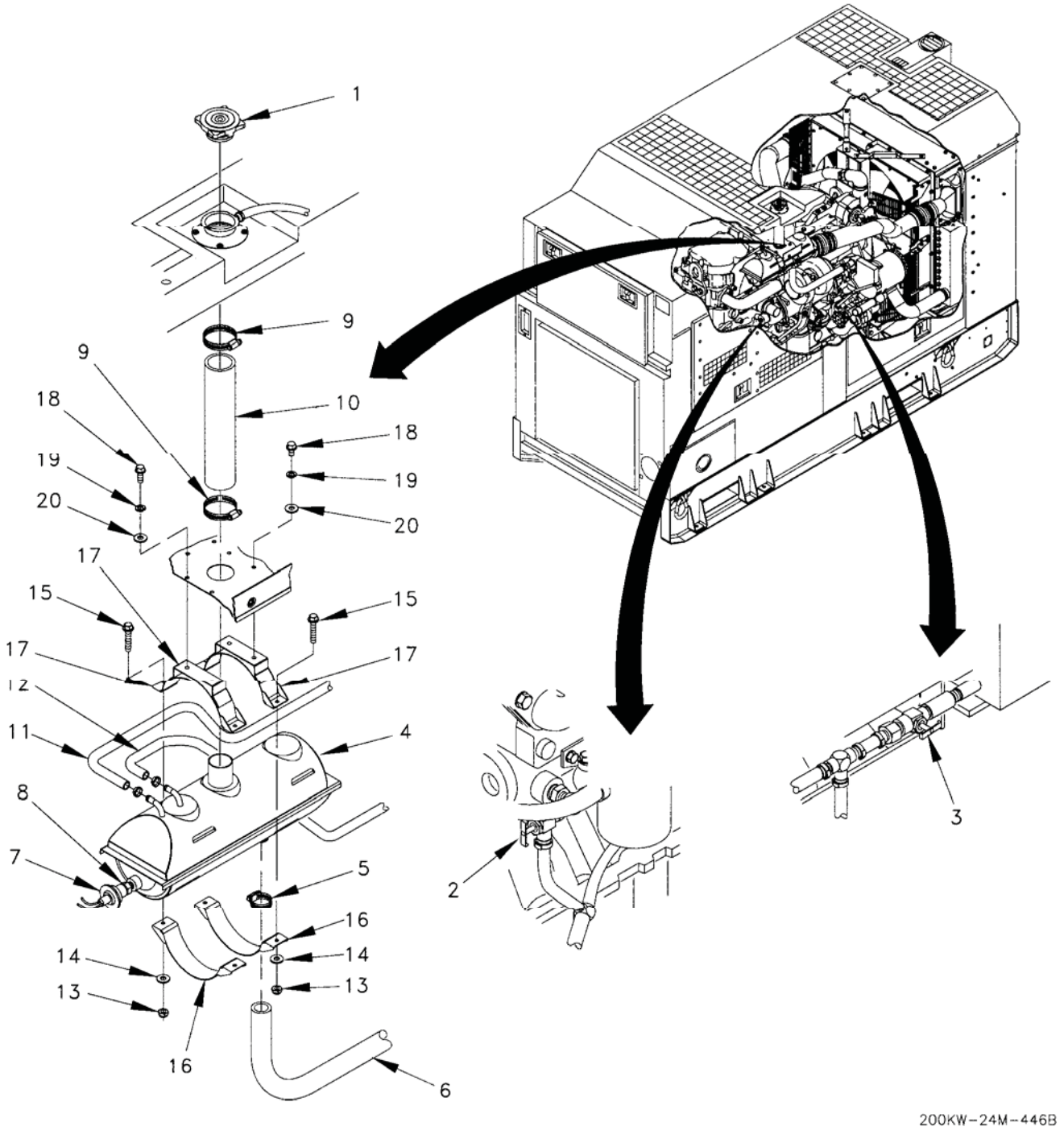

Figure 1. Surge Tank.

INSTALLATION - Continued

6. Connect hose (Figure 1, Item 6) to bottom of surge tank (Figure 1, Item 4) and install hose clamp (Figure 1, Item 5).

7. Pour coolant into COOLANT FILL and install fill cap (Figure 1, Item 1). If necessary, add coolant so level is between HOT and COLD marks on coolant recovery system bottle.

WARNING

Operating the generator set with any access door open exposes personnel to a high noise level. Hearing protection must be worn when operating or working near the generator set with any access door open. Failure to comply can cause hearing damage to personnel.

8. Operate TQG and check for leaks.

9. Install right side access cover (WP 0029).

10. Close right rear doors and right front doors.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

FAN AND FAN GUARDS MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

References

TM 9-6115-730-24P

Material/Parts

Antifreeze (WP 0124, item 5)

Equipment Condition

Cooling system drained (WP 0068)

Personnel Required

One

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/ or liquids can result in burns and scalding. Shut down generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply can cause injury or death to personnel.

Fan has sharp blades. Use caution and wear gloves when removing or installing belts. Failure to comply can cause injury to personnel.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Open right front doors and left front door.

NOTE

Table 1 lists removal and installation steps for fan and fan guard elements.

Table 1. WP 0066 Guide.

NAME	FIGURE 1 ITEM	REMOVAL STEPS	INSTALLATION STEPS
Upper right fan guard	4	3 thru 6	19 thru 23
Lower right fan guard	12	5 and 7 thru 9	17 thru 21
Upper left fan guard	36	10 thru 12	14 and 15
Lower left fan guard	37	13 and 14	12, 13 thru 15
Left shroud flange	41	20 thru 22 and 24	2, 4 thru 6
Right shroud flange	16	20 thru 23	3 thru 6
Fan and adapter	86, 87	3 thru 25	1 and 2

3. Remove nut (Figure 1, Sheet 1, Item 1), lockwasher (Figure 1, Sheet 1, Item 2), and screw (Figure 1, Sheet 1, Item 3) attaching rear of upper right fan guard (Figure 1, Sheet 1, Item 4) to top of engine.

4. If necessary, remove nut (Figure 1, Sheet 1, Item 5), washer (Figure 1, Sheet 1, Item 6), lockwasher (Figure 1, Sheet 1, Item 7), and bracket (Figure 1, Sheet 1, Item 8).

5. Remove two locknuts (Figure 1, Sheet 1, Item 9), washers (Figure 1, Sheet 1, Item 10), and screws (Figure 1, Sheet 1, Item 11) attaching upper right fan guard (Figure 1, Sheet 1, Item 4) and lower right fan guard (Figure 1, Sheet 1, Item 12) together.

6. Remove four screws (Figure 1, Sheet 1, Item 13), washers (Figure 1, Sheet 1, Item 14), lockwashers (Figure 1, Sheet 1, Item 15), and upper right fan guard (Figure 1, Sheet 1, Item 4) from right shroud flange (Figure 1, Sheet 1, Item 16).

7. Remove locknut (Figure 1, Sheet 1, Item 17), washer (Figure 1, Sheet 1, Item 18), and screw (Figure 1, Sheet 1, Item 19) attaching rear of lower right fan guard (Figure 1, Sheet 1, Item 12) to bracket (Figure 1 Sheet 1, Item 20) attached to engine.

REMOVAL - Continued

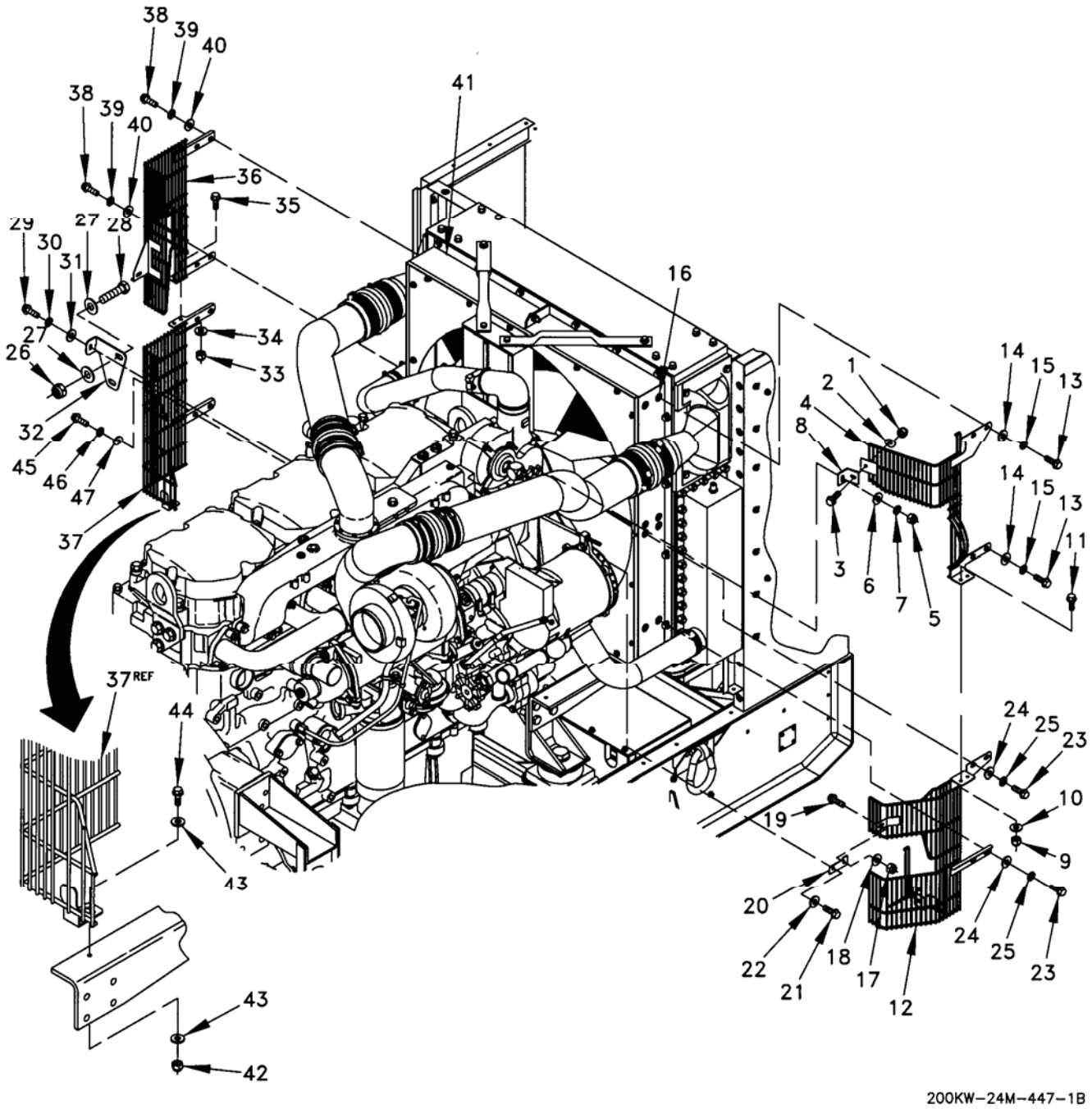

Figure 1. Fan and Fan Guards (Sheet 1 of 3).

REMOVAL - Continued

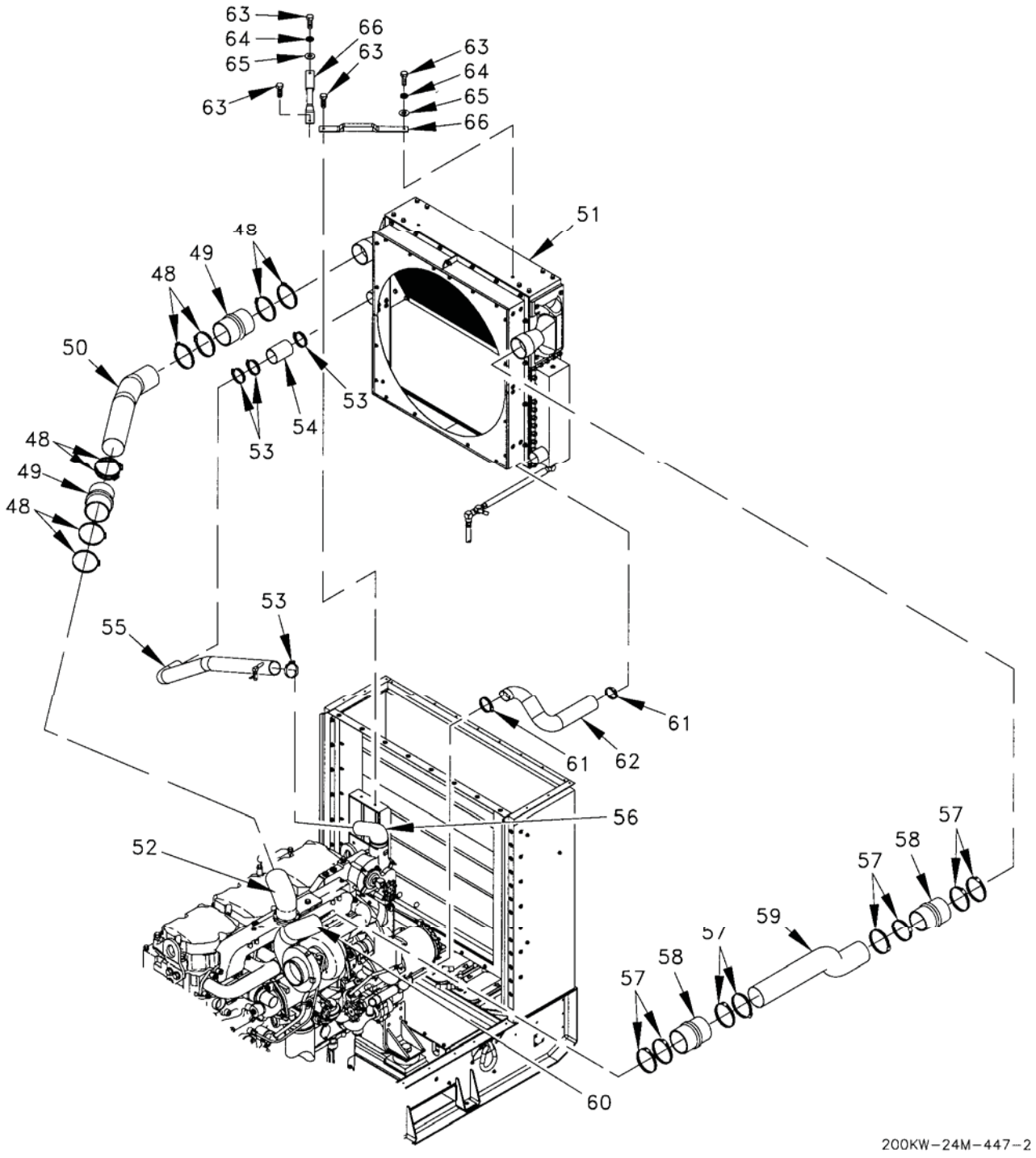

Figure 1. Fan and Fan Guards (Sheet 2 of 3).

REMOVAL - Continued

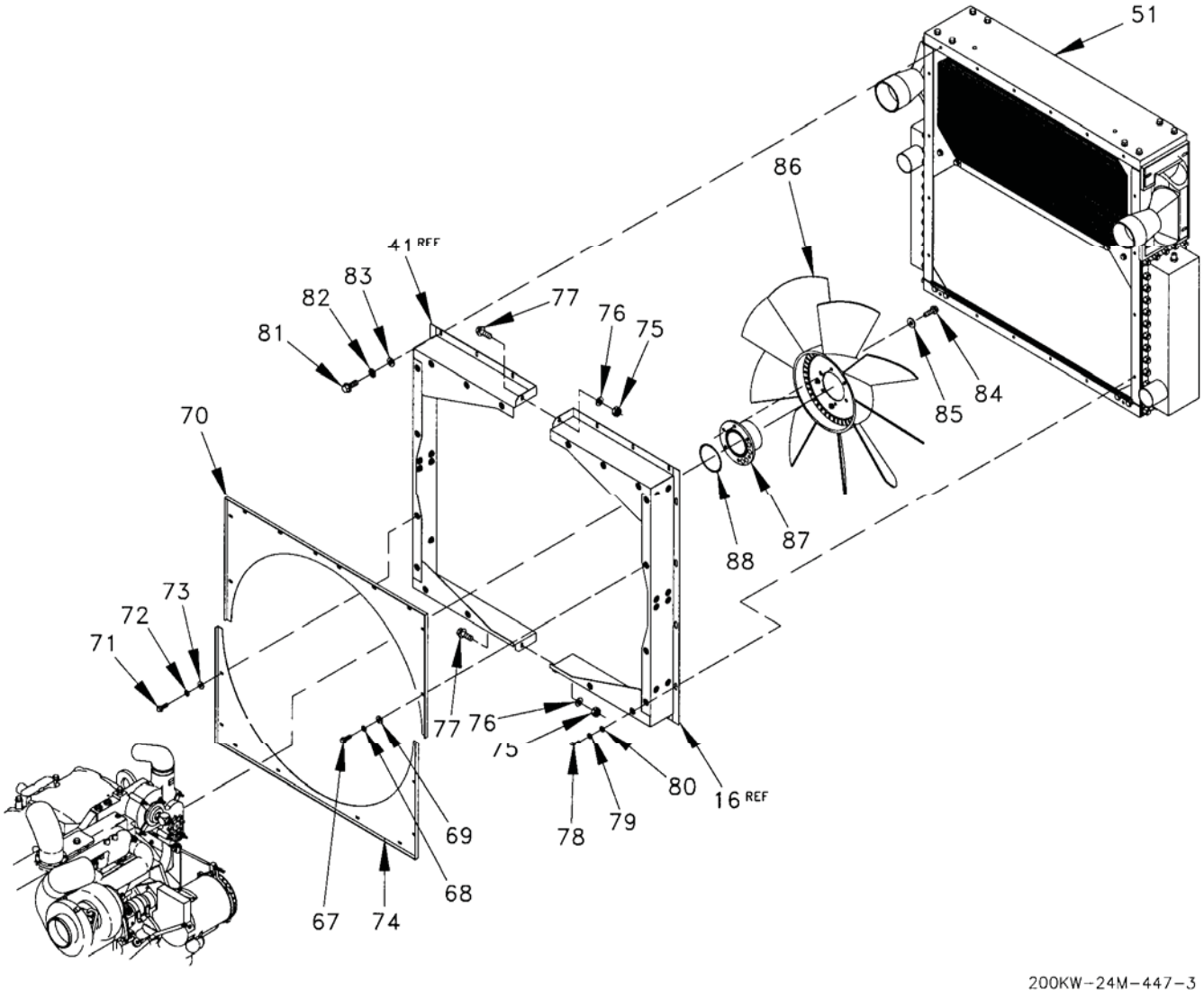

Figure 1. Fan and Fan Guards (Sheet 3 of 3).

REMOVAL - Continued

8. Remove screw (Figure 1, Sheet 1, Item 21) and washer (Figure 1, Sheet 1, Item 22) and remove bracket (Figure 1, Sheet 1, Item 20) from engine.

9. Remove four screws (Figure 1, Sheet 1, Item 23), lockwashers (Figure 1, Sheet 1, Item 24), washers (Figure 1, Sheet 1, Item 25) and lower right fan guard (Figure 1, Sheet 1, Item 12) from right shroud flange (Figure 1, Sheet 1, Item 16).

10. Remove locknut (Figure 1, Sheet 1, Item 26), two washers (Figure 1, Sheet 1, Item 27), and screw (Figure 1, Sheet 1, Item 28). Remove screw (Figure 1, Sheet 1, Item 29), lockwasher (Figure 1, Sheet 1, Item 30), and washer (Figure 1, Sheet 1, Item 31) and remove bracket (Figure 1, Sheet 1, Item 32) from engine.

11. Remove two locknuts (Figure 1, Sheet 1, Item 33), washers (Figure 1, Sheet 1, Item 34), and screws (Figure 1, Sheet 1, Item 35) that attach upper left fan guard (Figure 1, Sheet 1, Item 36) and lower left fan guard (Figure 1, Sheet 1, Item 37) together.

12. Remove four screws (Figure 1, Sheet 1, Item 38), lockwashers (Figure 1, Sheet 1, Item 39), washers (Figure 1, Sheet 1, Item 40), and upper left fan guard (Figure 1, Sheet 1, Item 36) from left shroud flange (Figure 1, Sheet 1, Item 41).

13. Remove locknut (Figure 1, Sheet 1, Item 42), two washers (Figure 1, Sheet 1, Item 43), and screw (Figure 1, Sheet 1, Item 44) from lower left fan guard (Figure 1, Sheet 1, Item 37).

14. Remove four screws (Figure 1, Sheet 1, Item 45), lockwashers (Figure 1, Sheet 1, Item 46), washers (Figure 1, Sheet 1, Item 47), and lower left fan guard (Figure 1, Sheet 1, Item 37) from left shroud flange (Figure 1, Sheet 1, Item 41).

15. Remove eight hose clamps (Figure 1, Sheet 2, Item 48), two hose connectors (Figure 1, Sheet 2, Item 49), and manifold in hose (Figure 1, Sheet 2, Item 50) from radiator (Figure 1, sheet 2, item 51) and from elbow (Figure 1, sheet 2, item 52).

16. Remove four hose clamps (Figure 1, Sheet 2, Item 53), coolant hose (Figure 1, Sheet 2, Item 54), and upper radiator hose (Figure 1, Sheet 2, Item 55) from radiator (Figure 1, sheet 2, item 51) and from elbow (Figure 1, sheet 2, item 56).

17. Remove eight hose clamps (Figure 1, Sheet 2, Item 57), two hose connectors (Figure 1, Sheet 2, Item 58), manifold out tube (Figure 1, Sheet 2, Item 59), from radiator (Figure 1, Sheet 2, Item 51) and from turbo out elbow (Figure 1, Sheet 2, Item 60).

18. Remove two hose clamps (Figure 1, Sheet 2, Item 61) and lower radiator hose (Figure 1, Sheet 2, Item 62), from radiator (Figure 1, Sheet 2, Item 51).

19. Remove four screws (Figure 1, Sheet 2, Item 63) and lockwashers (Figure 1, Sheet 2, Item 64), washers (Figure 1, Sheet 2, Item 65), and two radiator mounting tie rods (Figure 1, Sheet 2, Item 66).

20. Remove 10 screws (Figure 1, Sheet 3, Item 67), lockwashers (Figure 1, Sheet 3 Item 68), washers (Figure 1, Sheet 3, Item 69), and upper shroud plate (Figure 1, Sheet 3, Item 70) from right shroud flange (Figure 1, Sheet 1, Item 16) and left shroud flange (Figure 1, Sheet 1, Item 41).

21. Remove eight screws (Figure 1, Sheet 3, Item 71), lockwashers (Figure 1, Sheet 3, Item 72), washers (Figure 1, Sheet 3, Item 73), and lower shroud plate (Figure 1, Sheet 3, Item 74) from right shroud flange (Figure 1, Sheet 1, Item 16) and left shroud flange (Figure 1, Sheet 1, Item 41).

REMOVAL - Continued

22. Remove locknut (Figure 1, Sheet 3, Item 75), washer (Figure 1, Sheet 3, Item 76), and screw (Figure 1, Sheet 3, Item 77) in two places, top and bottom, that attach right shroud flange (Figure 1, Sheet 1, Item 16) and left shroud flange (Figure 1, Sheet 1, Item 41) together.

23. Remove 10 screws (Figure 1, Sheet 3, Item 78), lockwashers (Figure 1, Sheet 3, Item 79), washers (Figure 1, Sheet 3, Item 80), and right shroud flange (Figure 1, Sheet 1, Item 16) from radiator (Figure 1, Sheet 1, Item 51).

24. Remove 10 screws (Figure 1, Sheet 3, Item 81), lockwashers (Figure 1, Sheet 3, Item 82), washers (Figure 1, Sheet 3, Item 83), and left shroud flange (Figure 1, Sheet 1, Item 41) from radiator (Figure 1, Sheet 1, Item 51).

25. Remove 6 screws (Figure 1, Sheet 3, Item 84), washers (Figure 1, Sheet 3, Item 85), fan (Figure 1, Sheet 3, Item 86), fan mounting adapter (Figure 1, Sheet 3, Item 87), and O-ring (Figure 1, Sheet 3, Item 88).

END OF TASK

INSTALLATION

1. Install O-ring (Figure 1, Sheet 3, Item 88), fan mounting adapter (Figure 1, Sheet 3, Item 87), fan (Figure 1, Sheet 3, Item 86), and secure with six washers (Figure 1, Sheet 3, Item 85) and screws (Figure 1, Sheet 3, Item 84). Torque screws (Figure 1, Sheet 3, Item 86) to 27-33 lb-ft (37-44 Nm).

2. Install left shroud flange (Figure 1, Sheet 3, Item 41) onto radiator (Figure 1, Sheet 1, Item 51) and secure with 10 washers (Figure 1, Sheet 3, Item 83), lockwashers (Figure 1, Sheet 3, Item 82), and screws (Figure 1, Sheet 3, Item 81).

3. Install right shroud flange (Figure 1, Sheet 1, Item 16) onto radiator (Figure 1, Sheet 1, Item 51) and secure with 10 washers (Figure 1, Sheet 3, Item 80), lockwashers (Figure 1, Sheet 3, Item 79), and screws (Figure 1, Sheet 3, Item 78).

4. Hold right shroud flange (Figure 1, Sheet 1, Item 16) and left shroud flange (Figure 1, Sheet 1, Item 41) together and secure with screw (Figure 1, Sheet 3, Item 77), washer (Figure 1, Sheet 3, Item 76), and locknut (Figure 1, Sheet 3, Item 75), in two places, top and bottom.

5. Install lower shroud plate (Figure 1, Sheet 3, Item 74) onto right shroud flange (Figure 1, Sheet 1, Item 16) and left shroud flange (Figure 1, Sheet 1, Item 41) and secure with eight washers (Figure 1, Sheet 3, Item 73), lockwashers (Figure 1, Sheet 3, Item 72), and screws (Figure 1, Sheet 3, Item 71).

6. Install upper shroud plate (Figure 1, Sheet 3, Item 70) onto right shroud flange (Figure 1, Sheet 1, Item 16) and left shroud flange (Figure 1, Sheet 1, Item 41) and secure with 10 washers (Figure 1, Sheet 3, Item 69), lockwashers (Figure 1, Sheet 3, Item 68), and screws (Figure 1, Sheet 3, Item 67).

7. Install two radiator mounting tie rods (Figure 1, Sheet 2, Item 66) with two washers (Figure 1, Sheet 2, Item 65), lockwashers (Figure 1, Sheet 2, Item 64), and four screws (Figure 1, Sheet 2, Item 63).

8. Install lower radiator hose (Figure 1, Sheet 2, Item 62) onto radiator (Figure 1, Sheet 2, Item 51) and secure with two hose clamps (Figure 1, Sheet 2, Item 61).

9. Install manifold out tube (Figure 1, Sheet 2, Item 59) and two hose connectors (Figure 1, Sheet 2, Item 58) onto turbo out elbow (Figure 1, Sheet 2, Item 60) and onto radiator (Figure 1, Sheet 2, Item 51) and secure with eight hose clamps (Figure 1, Sheet 2, Item 57).

INSTALLATION - Continued

10. Install upper radiator hose (Figure 1, Sheet 2, Item 55) and coolant hose (Figure 1, Sheet 2, Item 54) onto radiator (Figure 1, Sheet 2, item 51) and onto elbow (Figure 1, Sheet 2, item 56) and secure with four hose clamps (Figure 1, Sheet 2, Item 53).

11. Install manifold in hose (Figure 1, Sheet 2, Item 50) and two hose connectors (Figure 1, Sheet 2, Item 49) onto elbow (Figure 1, sheet 2, item 52) and onto radiator (Figure 1, Sheet 2, item 51) and secure with eight hose clamps (Figure 1, Sheet 2, Item 48).

12. Install lower left fan guard (Figure 1, Sheet 1, Item 37) on left shroud flange (Figure 1, Sheet 1, Item 41) and secure with four washers (Figure 1, Sheet 1, Item 47), lockwashers (Figure 1, Sheet 1, Item 46), and screws (Figure 1, Sheet 1, Item 45).

13. Install screw (Figure 1, Sheet 1, Item 44), two washers (Figure 1, Sheet 1, Item 43), and locknut (Figure 1, Sheet 1, Item 42) on lower fan left guard (Figure 1, Sheet 1, Item 37).

14. Install upper left fan guard (Figure 1, Sheet 1, Item 36) on left shroud flange (Figure 1, Sheet 1, Item 41) and secure with four washers (Figure 1, Sheet 1, Item 40), lockwashers (Figure 1, Sheet 1, Item 39), and screws (Figure 1, Sheet 1, Item 38).

15. Hold upper left fan guard (Figure 1, Sheet 1, Item 36) and lower left fan guard (Figure 1, Sheet 1, Item 37) together and secure with two screws (Figure 1, Sheet 1, Item 35), washers (Figure 1, Sheet 1, Item 34), and locknuts (Figure 1, Sheet 1, Item 33).

16. Install bracket (Figure 1, Sheet 1, Item 32) on engine and secure with screw (Figure 1, Sheet 1, Item 29), lockwasher (Figure 1, Sheet 1, Item 30), and washer (Figure 1, Sheet 1, Item 31. Install screw (Figure 1, Sheet 1, Item 28), two washers (Figure 1, Sheet 1, Item 27), and locknut (Figure 1, Sheet 1, Item 26).

17. Install lower right fan guard (Figure 1, Sheet 1, Item 12) on right shroud flange (Figure 1, Sheet 1, Item 16), and secure with four washers (Figure 1, Sheet 1, Item 25), lockwashers (Figure 1, Sheet 1, Item 24), and screws (Figure 1, Sheet 1, Item 23).

18. Install bracket (Figure 1, Sheet 1, Item 20) on engine and secure with washer (Figure 1, Sheet 1, Item 12) and screw (Figure 1, Sheet 1, Item 21).

19. Attach rear of lower right fan guard (Figure 1, Sheet 1, Item 12) to bracket (Figure 1, Sheet 1, Item 20) and secure with screw (Figure 1, Sheet 1, Item 19), washer (Figure 1, Sheet 1, Item 18), and locknut (Figure 1, Sheet 1, Item 17).

20. Install upper right fan guard (Figure 1, Sheet 1, Item 4) on right shroud flange (Figure 1, Sheet 1, Item 16) and secure with four lockwashers (Figure 1, Sheet 1, Item 15), washers (Figure 1, Sheet 1, Item 14), and screws (Figure 1, Sheet 1, Item 13).

21. Hold upper right fan guard (Figure 1, Sheet 1, Item 4) and lower right fan guard (Figure 1, Sheet 1, Item 12) together, and secure with two screws (Figure 1, Sheet 1, Item 11), washers (Figure 1, Sheet 1, Item 10), and locknuts (Figure 1, Sheet 1, Item 9).

INSTALLATION - Continued

22. If necessary, install bracket (Figure 1, Sheet 1, Item 8) with nut (Figure 1, Sheet 1, Item 5), washer (Figure 1, Sheet 1, Item 6), and lockwasher (Figure 1, Sheet 1, Item 7).

23. Secure rear of upper right fan guard (Figure 1, Sheet 1, Item 4) to engine with screw (Figure 1, Sheet 1, Item 3), lockwasher (Figure 1, Sheet 1, Item 2) and nut (Figure 1, Sheet 1, Item 1).

24. Refill cooling system with coolant.

25. Close left front door and right front doors.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
COOLANT HOSE ASSEMBLIES MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Tool Kit, General Mechanic's (WP 0123, Item 1)

Materials/Parts

Antifreeze (WP 0124, Item 5)
Cap and plug set (WP 0124, Item 6)
Sealant (WP 0124, Item 37)

Personnel Required

One

References

TM 9-6115-730-24P

Equipment Condition

Side access panel removed (WP 0029)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/ or liquids can result in burns and scalding. Shut down generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the coolant system.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Open left front door, left rear doors, right front doors, and right rear doors.

NOTE

Coolant system capacity is 42 quarts (39.7 liters).

3. Place suitable container under coolant drain on front right side of TQG. Open drain valve (Figure 1, Sheet 3, Item 1) on right rear side of engine, and drain valve (Figure 1, Sheet 3, Item 2) on front right side bottom of engine, and drain coolant. Save coolant for refilling system.

4. On right side, remove two hose clamps (Figure 1, Sheet 3, Item 3) and hose (Figure 1, Sheet 3, Item 4) from radiator filler neck and from coolant recovery system.

5. Remove two hose clamps (Figure 1, Sheet 3, Item 5) and hose (Figure 1, Sheet 3, Item 6) from coolant recovery system and from tee fitting (Figure 1, Sheet 3, Item 7).

6. Remove locknut (Figure 1, Sheet 4, Item 8), screw (Figure 1, Sheet 4, Item 9), washer (Figure 1, Sheet 4, Item 10), and loop clamp (Figure 1, Sheet 4, Item 11). Remove two hose clamps (Figure 1, Sheet 4, Item 12) and hose (Figure 1, Sheet 3, Item 13) from tee fitting (Figure 1, Sheet 3, Item 7) and tee fitting (Figure 1, Sheet 4, Item 14).

7. Remove loop clamp (Figure 1, Sheet 4, Item 15) and hose (Figure 1, Sheet 1, Item 16) from bottom of water separator filter.

8. Remove fitting (Figure 1, Sheet 3, Item 17), 90 degree elbow (Figure 1, Sheet 3, Item 18), drain valve (Figure 1, Sheet 3, Item 2), nipple (Figure 1, Sheet 3, Item 19), and 90 degree elbow (Figure 1, Sheet 3, Item 20) from bottom of radiator.

9. At rear of engine, remove two hose clamps (Figure 1, Sheet 3, Item 21), hose (Figure 1, Sheet 3, Item 22), drain valve (Figure 1, Sheet 3, Item 1), and reducer fitting (Figure 1, Sheet 3, Item 23).

10. At radiator filler neck, remove two hose clamps (Figure 1, Sheet 3, Item 24) and hose (Figure 1, Sheet 3, Item 25).

11. At top of surge tank, remove two hose clamps (Figure 1, Sheet 2, Item 26) and disconnect hose (Figure 1, Sheet 2, Item 27) and hose (Figure 1, Sheet 2, Item 28).

12. On top of engine, remove two loop clamps (Figure 1, Sheet 2, Item 29).

13. On right side of engine, remove hose clamp (Figure 1, Sheet 3, Item 30) and remove hose (Figure 1, Sheet 2, Item 27). On right side of radiator, remove hose clamp (Figure 1, Sheet 3, Item 31) and hose (Figure 1, Sheet 2, Item 28). Remove two fittings (Figure 1, Sheet 3, Item 32).

14. Remove two hose clamps (Figure 1, Sheet 3, Item 33) and hose (Figure 1, Sheet 3, Item 34). Remove fitting (Figure 1, Sheet 3, Item 35), 90 degree elbow (Figure 1, Sheet 3, Item 36), and nipple (Figure 1, Sheet 3, Item 37).

15. On top of engine, remove eight hose clamps (Figure 1, Sheet 2, Item 38), manifold out tube (Figure 1, Sheet 2, Item 39), and two bellows (Figure 1, Sheet 2, Item 40).

REMOVAL - Continued

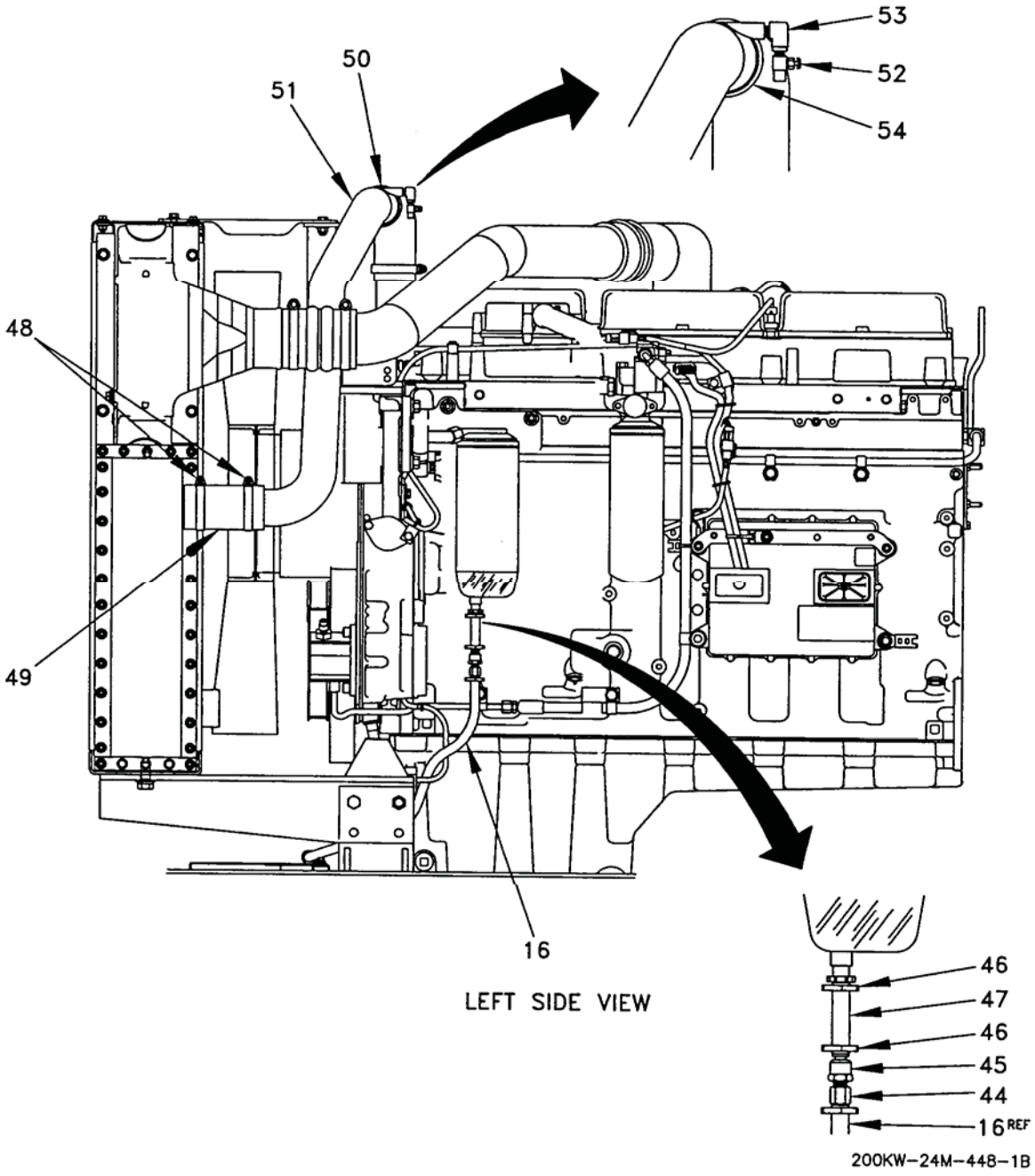

Figure 1. Coolant Hose Assemblies (Sheet 1 of 4).

REMOVAL - Continued

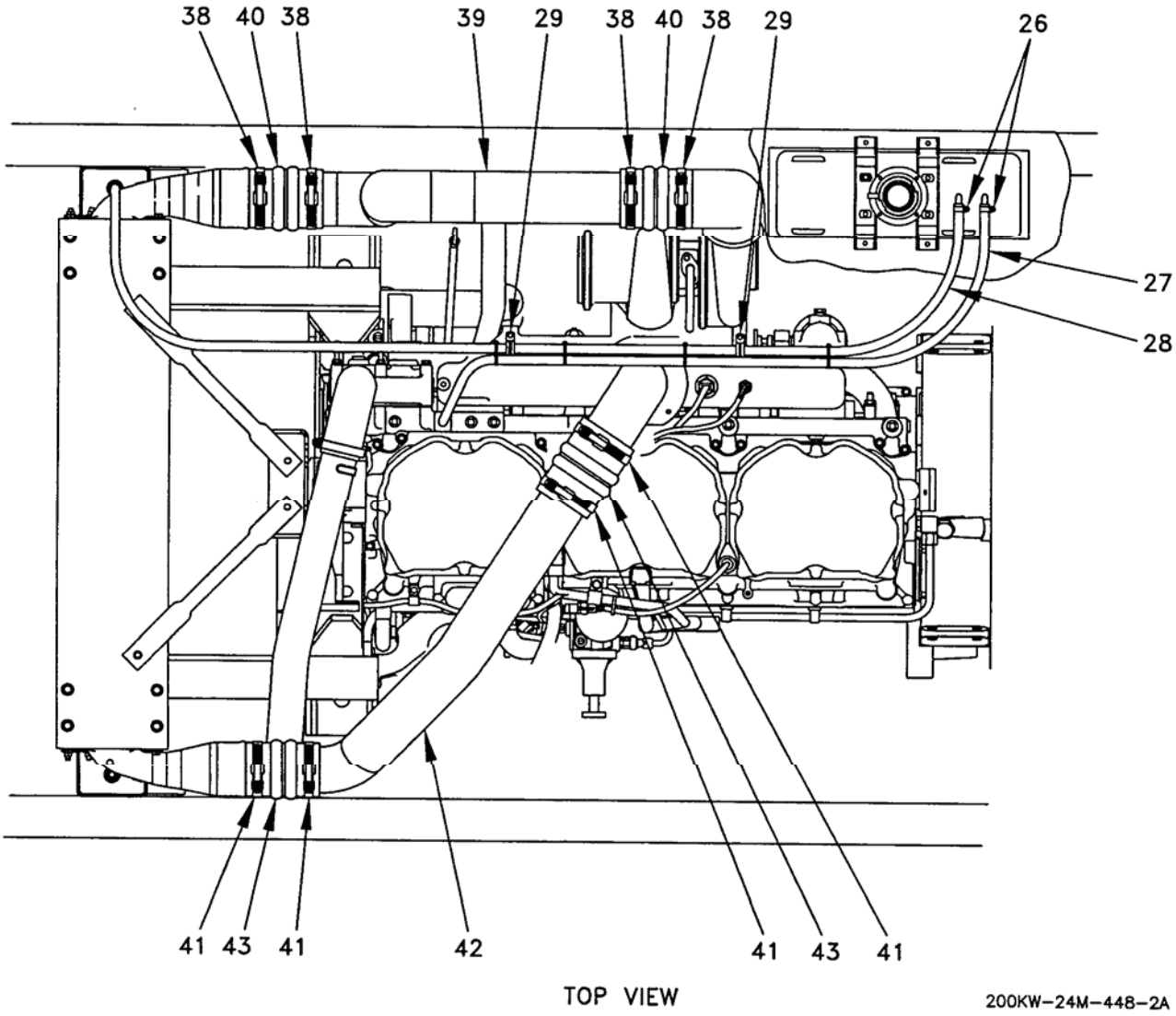

Figure 1. Coolant Hose Assemblies (Sheet 2 of 4).

REMOVAL - Continued

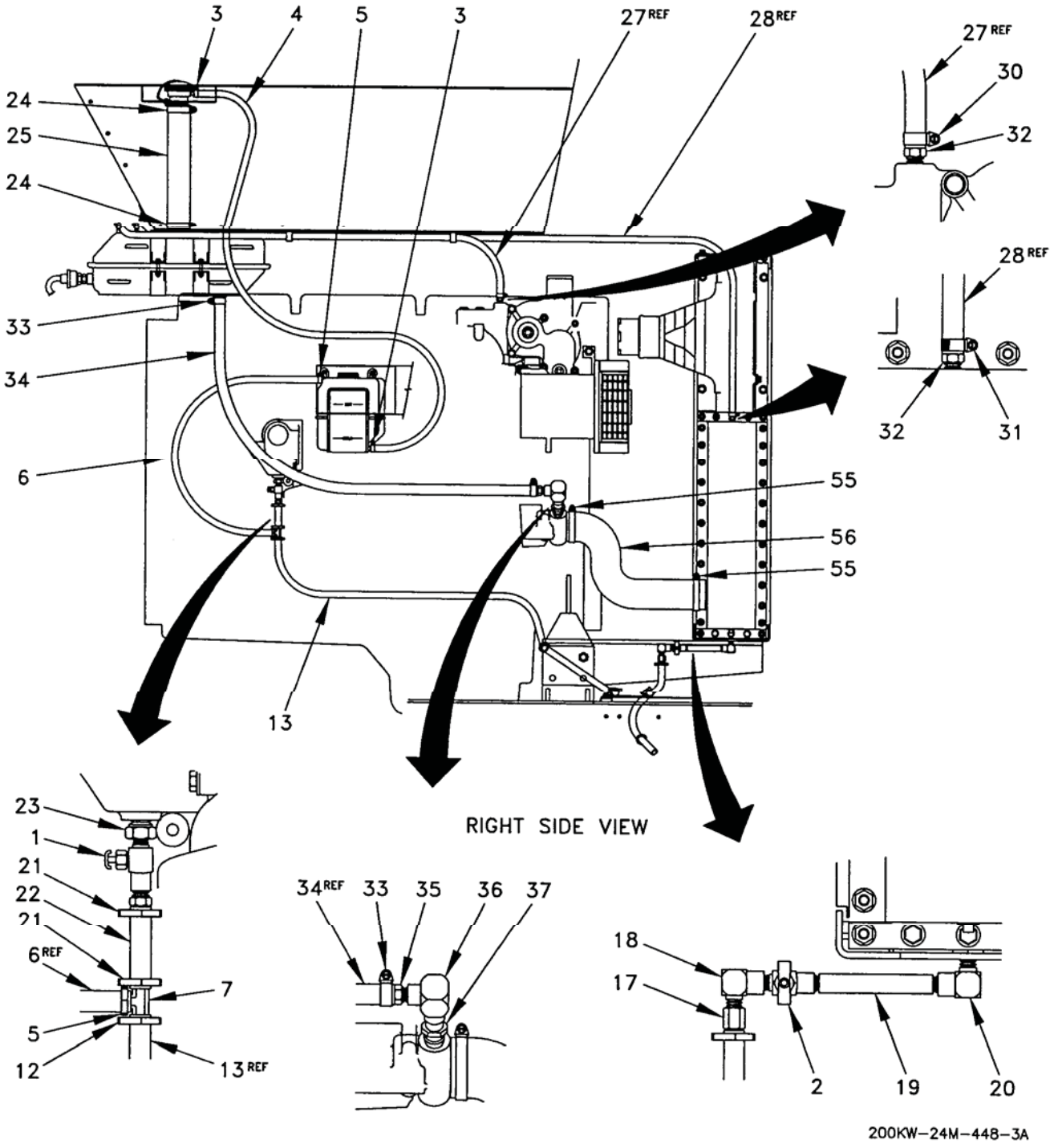

Figure 1. Coolant Hose Assemblies (Sheet 3 of 4).

REMOVAL - Continued

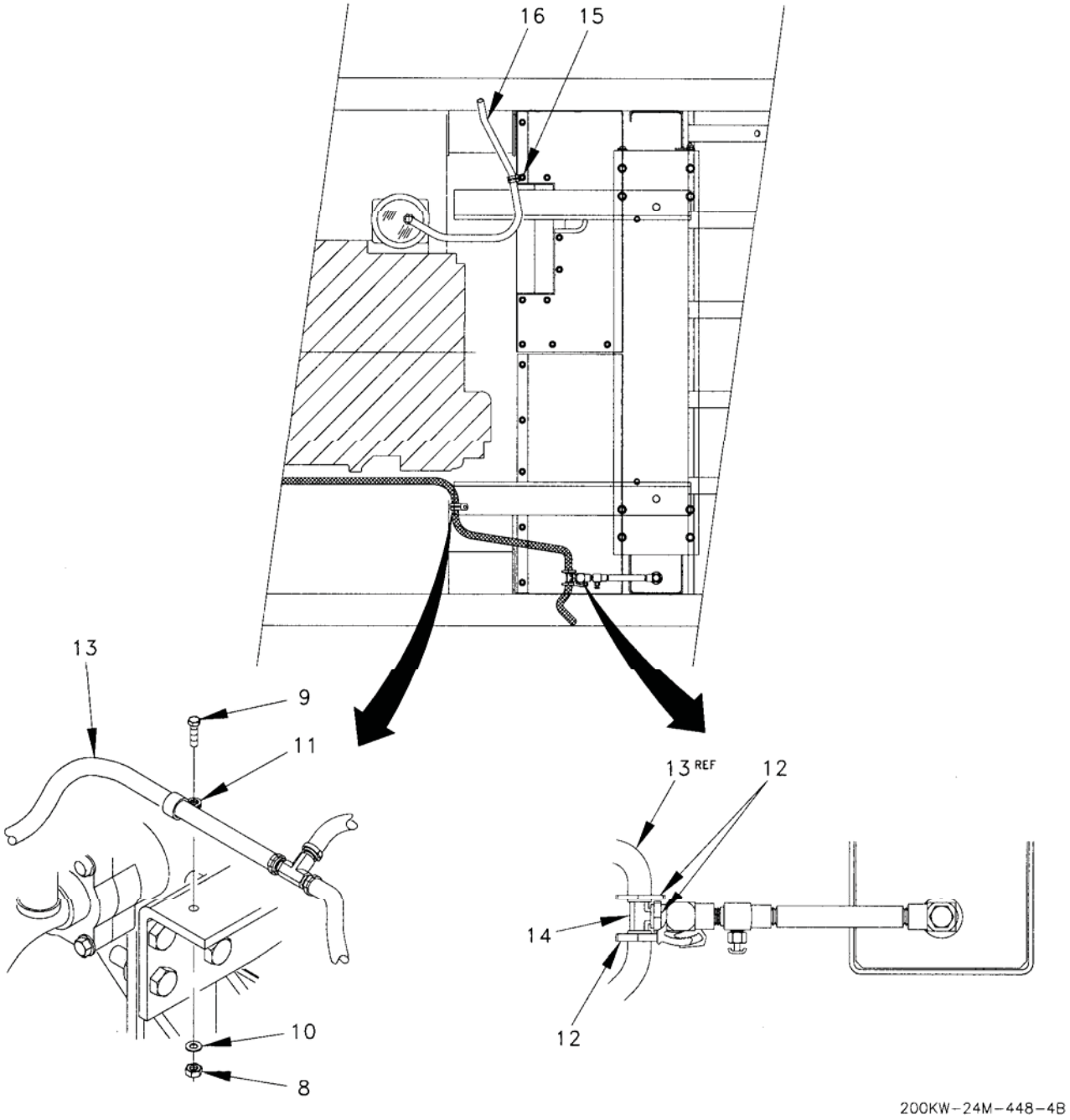

Figure 1. Coolant Hose Assemblies (Sheet 4 of 4).

REMOVAL - Continued

16. Remove eight hose clamps (Figure 1, Sheet 2, Item 41), manifold in tube (Figure 1, Sheet 2, Item 42), and two bellows (Figure 1, Sheet 2, Item 43).

17. Below water separator filter, remove hose barb fitting (Figure 1, Sheet 1, Item 44), swivel fitting (Figure 1, Sheet 1, Item 45), two hose clamps (Figure 1, Sheet 1, Item 46), and hose (Figure 1, Sheet 1, Item 47).

18. On left side of engine, remove two hose clamps (Figure 1, Sheet 1, Item 48), hose (Figure 1, Sheet 1, Item 49), hose clamp (Figure 1, Sheet 1, Item 50), upper radiator hose (Figure 1, Sheet 1, Item 51), drain valve (Figure 1, Sheet 1, Item 52), 90 degree elbow (Figure 1, Sheet 1, Item 53), and hose elbow (Figure 1, Sheet 1, Item 54).

19. On lower right side of engine, remove two hose clamps (Figure 1, Sheet 3, Item 55) and lower radiator hose (Figure 1, Sheet 3, Item 56).

END OF TASK

INSTALLATION

NOTE

Apply sealing compound to all male pipe threads before connecting.

1. At lower right side of engine, install lower radiator hose (Figure 1, Sheet 3, Item 56) and two hose clamps (Figure 1, Sheet 3, Item 55).

2. On left side of engine, install hose elbow (Figure 1, Sheet 1, Item 54), 90 degree elbow (Figure 1, Sheet 1, Item 53), drain valve (Figure 1, Sheet 1, Item 52), upper radiator hose (Figure 1, Sheet 1, Item 51), hose clamp (Figure 1, Sheet 1, Item 50), hose (Figure 1, Sheet 1, Item 49), and two hose clamps (Figure 1, Sheet 1, Item 48).

3. Below water separator filter, install hose (Figure 1, Sheet 1, Item 47), two hose clamps (Figure 1, Sheet 1, Item 46), swivel fitting (Figure 1, Sheet 1, Item 45), and hose barb fitting (Figure 1, Sheet 1, Item 44).

4. On top of engine, install two bellows (Figure 1, Sheet 2, Item 43), manifold in tube (Figure 1, Sheet 2, Item 42), and eight hose clamps (Figure 1, Sheet 2, Item 41).

5. Install two bellows (Figure 1, Sheet 2, Item 40), manifold out tube (Figure 1, Sheet 2, Item 39), and eight hose clamps (Figure 1, Sheet 2, Item 38).

6. On right side of engine, install nipple (Figure 1, Sheet 3, Item 37), 90 degree elbow (Figure 1, Sheet 3, Item 36), and fitting (Figure 1, Sheet 3, Item 35). Install hose (Figure 1, Sheet 3, Item 34) and two hose clamps (Figure 1, Sheet 3, Item 33).

7. On right side of radiator, install two fittings (Figure 1, Sheet 3, Item 32), hose (Figure 1, Sheet 2, Item 28), and hose clamp (Figure 1, Sheet 3, Item 31). On right side of engine, install hose (Figure 1, Sheet 2, Item 27) and hose clamp (Figure 1, Sheet 3, Item 30).

8. On top of engine, install two loop clamps (Figure 1, Sheet 2, Item 29).

INSTALLATION - Continued

9. At top of surge tank, connect hose (Figure 1, Sheet 2, Item 28) and hose (Figure 1, Sheet 2, Item 27), and install two hose clamps (Figure 1, Sheet 2, Item 26).

10. At radiator filler neck, install hose (Figure 1, Sheet 3, Item 25) and two hose clamps (Figure 1, Sheet 3, Item 24).

11. At rear of engine, install reducer fitting (Figure 1, Sheet 3, Item 23), drain valve (Figure 1, Sheet 3, Item 1), hose (Figure 1, Sheet 3, Item 22), and two hose clamps (Figure 1, Sheet 3, Item 21).

12. At bottom of radiator, install 90 degree elbow (Figure 1, Sheet 3, Item 20), nipple (Figure 1, Sheet 3, Item 19), drain valve (Figure 1, Sheet 3, Item 2), 90 degree elbow (Figure 1, Sheet 3, Item 18), and fitting (Figure 1, Sheet 3, Item 17).

13. Install hose (Figure 1, Sheet 1, Item 16) and loop clamp (Figure 1, Sheet 4, Item 15) to bottom of water separator filter.

14. Install hose (Figure 1, Sheet 3, Item 13) and three hose clamps (Figure 1, Sheet 4, Item 12) on tee fitting (Figure 1, Sheet 4, Item 14).

15. At lower rear of radiator, install loop clamp (Figure 1, Sheet 4, Item 11), washer (Figure 1, Sheet 4, Item 10), screw (Figure 1, Sheet 4, Item 9), and locknut (Figure 1, Sheet 4, Item 8).

16. Connect hose (Figure 1, Sheet 3, Item 6) to tee fitting (Figure 1, Sheet 3, Item 7) and to coolant recovery system, and install two hose clamps (Figure 1, Sheet 3, Item 5).

17. Install hose (Figure 1, Sheet 3, Item 4) to coolant recovery system and radiator filler neck and install two hose clamps (Figure 1, Sheet 3, Item 3).

18. Close drain valve (Figure 1, Sheet 3, Item 2) on front right side bottom of engine and close drain valve (Figure 1, Sheet 3, Item 1) on right rear side of engine.

NOTE

Coolant system capacity is 42 quarts (39.7 liters).

19. Refill cooling system with coolant.

20. Install side access cover (WP 0029).

21. Close right rear doors, right front doors, left rear doors, and left front door.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
RADIATOR ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Tool Kit, General Mechanic's (WP 0123, Item 1)

Materials/Parts

Antifreeze (WP 0124, Item 5)
Cap and plug set (WP 0124, Item 6)
Sealing compound (WP 0124, Item 40)

Personnel Required

Two

References

TM 750-254
TM 9-6115-730-24P

Equipment Condition

Front roof section housing assembly removed (WP 0030)
Rear roof section housing assembly removed (WP 0031)
Exhaust system removed (WP 0069)
Engine generator compartment ceiling assembly removed (WP 0032)
Fan guards, shrouds, and upper and lower shroud plates removed (WP 0066)
Right front door assembly (latch) removed (WP 0025)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

WARNING

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/ or liquids can result in burns and scalding. Shut down generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply can cause injury or death to personnel.

Radiator weighs more than 140 pounds (64 kg) and requires a two-person lift. Lifting radiator can cause back strain. Ensure proper lifting techniques are used when lifting radiator. Failure to comply can cause injury to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the coolant system.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Open left front door and right front doors.

NOTE

Coolant system capacity is 42 quarts (39.7 liters).

3. Place suitable container under COOLANT DRAIN on front right side of TQG. Open drain valve (Figure 1, Sheet 1, Item 1) on right side at rear of engine, and drain valve (Figure 1, Sheet 1, Item 2) on lower right front of engine, and drain coolant. Save coolant for refilling system.

4. Remove sill from upper edge of left front door assembly (latch) opening.

5. Remove document box, located above right front door assembly (latch).

6. On right side of engine, remove hose clamp (Figure 1, Sheet 2, Item 3) and disconnect hose (Figure 1, Sheet 2, Item 4) from barbed fitting (Figure 1, Sheet 2, Item 5). Remove barbed fitting (Figure 1, Sheet 2, Item 5) from radiator (Figure 1, Sheet 1, Item 6).

7. Remove eight hose clamps (Figure 1, Sheet 1, Item 7), two bellows (Figure 1, Sheet 1, Item 8), and manifold out tube (Figure 1, Sheet 1, Item 9) from right side of radiator (Figure 1, Sheet 1, Item 6).

8. Remove two hose clamps (Figure 1, Sheet 2, Item 10) and lower radiator hose (Figure 1, Sheet 2, Item 11).

9. Remove hose clamp (Figure 1, Sheet 1, Item 12) and disconnect coolant hose (Figure 1, Sheet 1, Item 13) from female connector (Figure 1, Sheet 1, Item 14) on lower right side of radiator (Figure 1, Sheet 1, Item 6).

10. Remove female connector (Figure 1, Sheet 1, Item 14), 90 degree elbow (Figure 1, Sheet 1, Item 15), drain valve (Figure 1, Sheet 1, Item 2), nipple (Figure 1, Sheet 1, Item 16), and 90 degree elbow (Figure 1, Sheet 1, Item 17) from radiator (Figure 1, Sheet 1, Item 6).

REMOVAL - Continued

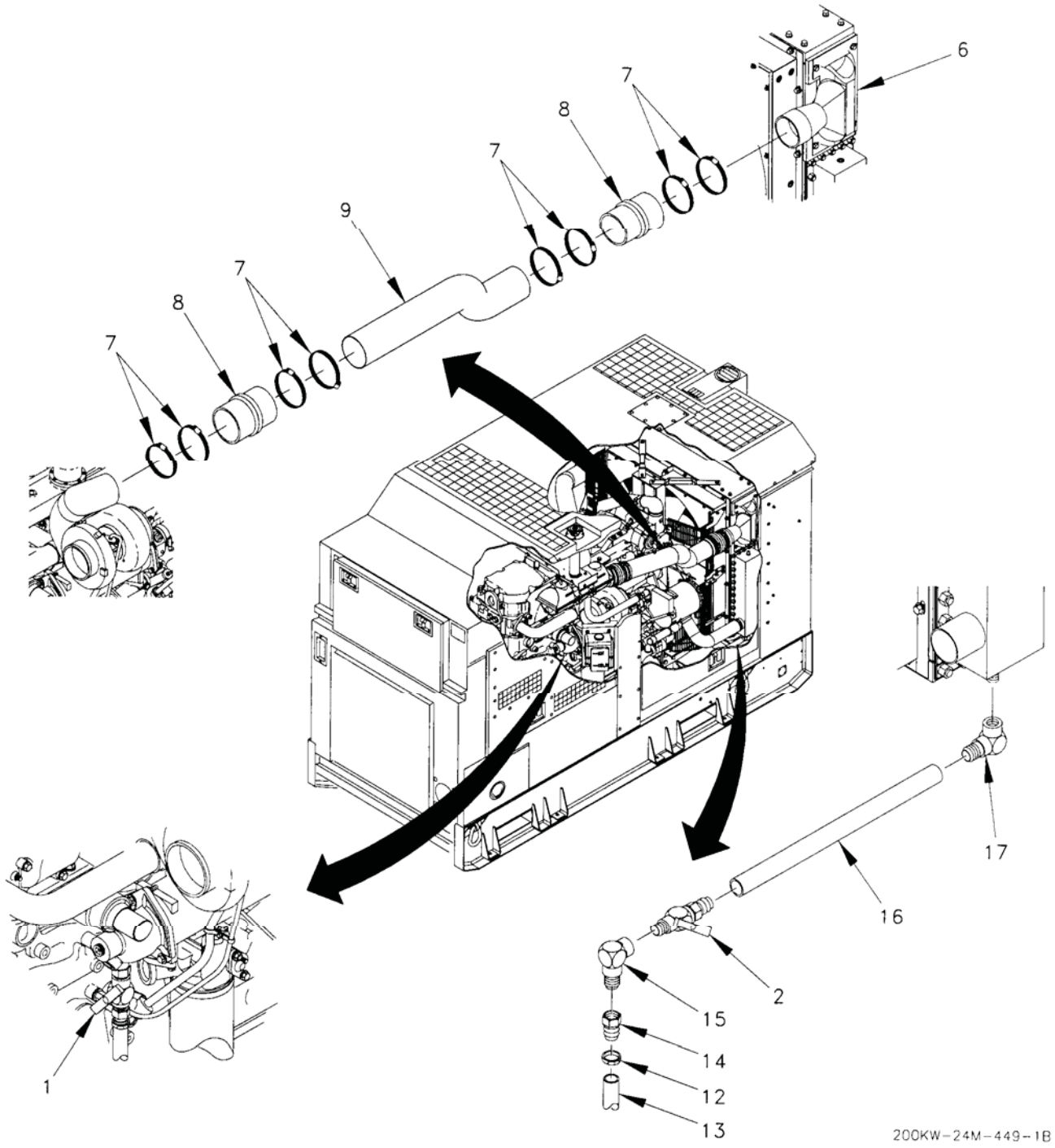

Figure 1. Radiator Assembly (Sheet 1 of 2).

REMOVAL - Continued

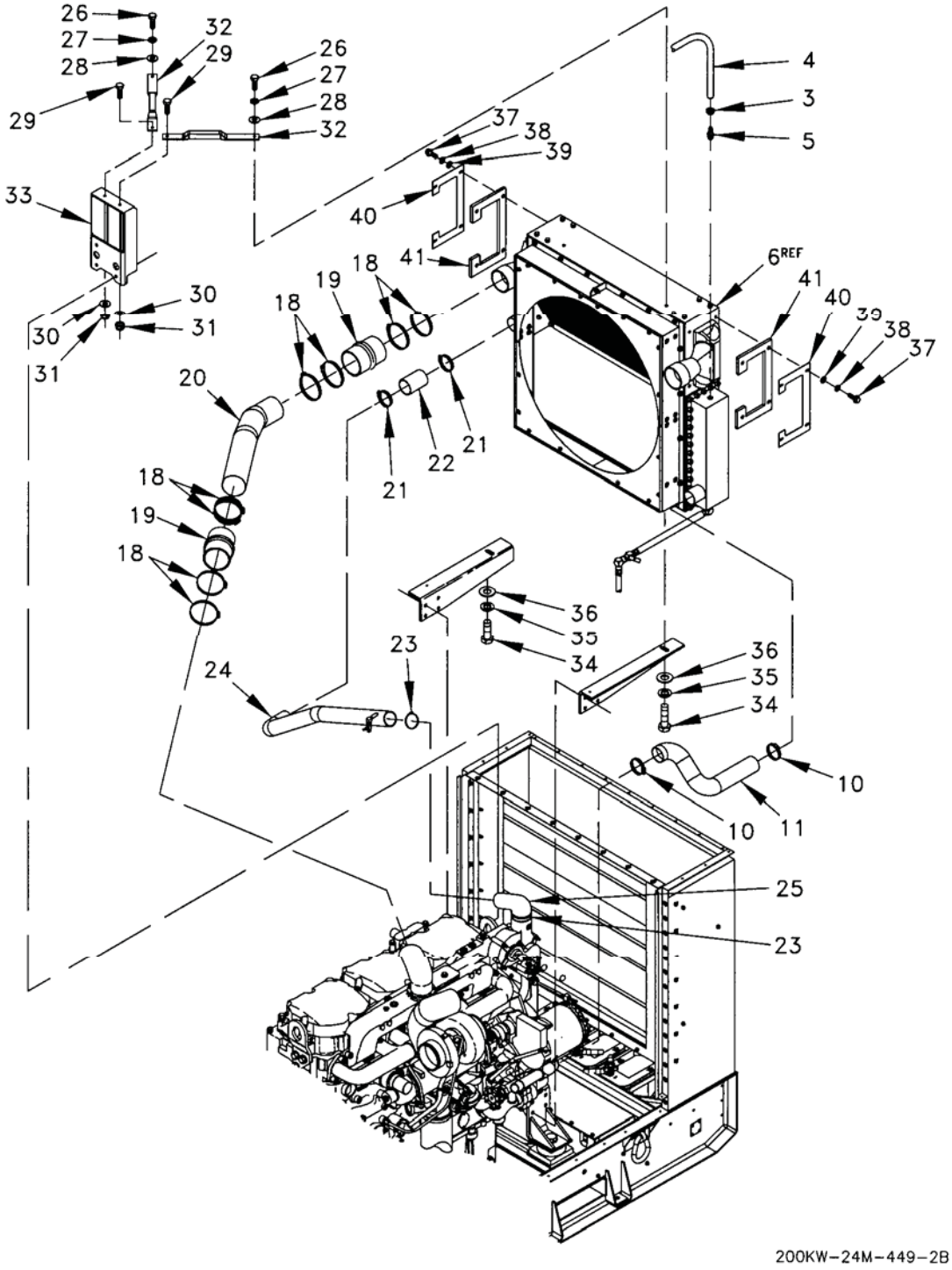

Figure 1. Radiator Assembly (Sheet 2 of 2).

REMOVAL - Continued

11. At top of engine, remove eight hose clamps (Figure 1, Sheet 2, Item 18), two bellows (Figure 1, Sheet 2, Item 19), and manifold in tube (Figure 1, Sheet 2, Item 20).

12. Remove two hose clamps (Figure 1, Sheet 2, Item 21), coolant hose (Figure 1, Sheet 2, Item 22), two hose clamps (Figure 1, Sheet 2, Item 23), upper radiator hose (Figure 1, Sheet 2, Item 24), and elbow (Figure 1, Sheet 2, Item 25).

13. Remove two screws (Figure 1, Sheet 2, Item 26), lockwashers (Figure 1, Sheet 2, Item 27), and washers (Figure 1, Sheet 2, Item 28).

14. Remove two screws (Figure 1, Sheet 2, Item 29), lockwashers (Figure 1, Sheet 2, Item 30), nuts (Figure 1, Sheet 2, Item 31), and two upper radiator mounting tie rods (Figure 1, Sheet 2, Item 32) from radiator (Figure 1, Sheet 1, Item 6) and upper radiator support mounting bracket (Figure 1, Sheet 2, Item 33).

WARNING

Radiator weighs more than 140 pounds (64 kg) and requires a two-person lift. Lifting radiator can cause back strain. Ensure proper lifting techniques are used when lifting radiator. Failure to comply can cause injury to personnel.

15. Under radiator (Figure 1, Sheet 1, Item 6), remove two screws (Figure 1, Sheet 2, Item 34), lockwashers (Figure 1, Sheet 2, Item 35), and washers (Figure 1, Sheet 2, Item 36), and remove radiator (Figure 1, Sheet 1, Item 6) out of housing through left front door assembly (latch).

16. Remove four screws (Figure 1, Sheet 2, Item 37), lockwashers (Figure 1, Sheet 2, Item 38), washers (Figure 1, Sheet 2, Item 39), radiator air block plate (Figure 1, Sheet 2, Item 40) and foam (Figure 1, Sheet 2, Item 41) from upper right side of radiator (Figure 1, Sheet 1, Item 6). Repeat for left side of radiator (Figure 1, Sheet 1, Item 6).

END OF TASK

REPAIR OR REPLACEMENT

1. For repair of the radiator, refer to procedures in TM 750-254, Cooling Systems: Tactical Vehicles.

2. Inspect foam (Figure 1, Sheet 2, Item 41) and repair or replace, as required.

END OF TASK

INSTALLATION

1. Install foam (Figure 1, Sheet 2, Item 41) and radiator air block plate (Figure 1, Sheet 2, Item 40) on upper right side of radiator (Figure 1, Sheet 1, Item 6), and secure with four washers (Figure 1, Sheet 2, Item 39), lockwashers (Figure 1, Sheet 2, Item 38), and screws (Figure 1, Sheet 2, Item 37). Repeat for left side of radiator (Figure 1, Sheet 1, Item 6).

WARNING

Radiator weighs more than 140 pounds (64 kg) and requires a two-person lift. Lifting radiator can cause back strain. Ensure proper lifting techniques are used when lifting radiator. Failure to comply can cause injury to personnel.

NOTE

Apply sealing compound to all male pipe threads before connecting.

2. Install radiator (Figure 1, Sheet 1, Item 6) through left front door assembly (latch) and install two washers (Figure 1, Sheet 2, Item 36), lockwashers (Figure 1, Sheet 2, Item 35) and screws (Figure 1, Sheet 2, Item 34) under radiator.

3. Install two upper radiator mounting tie rods (Figure 1, Sheet 2, Item 32) and to upper radiator support mounting bracket (Figure 1, Sheet 2, Item 33) and secure with two screws (Figure 1, Sheet 2, Item 29), lockwashers (Figure 1, Sheet 2, Item 30), and nuts (Figure 1, Sheet 2, Item 31).

4. Install two screws (Figure 1, Sheet 2, Item 26), lockwashers (Figure 1, Sheet 2, Item 27), and washers (Figure 1, Sheet 2, Item 28).

5. Install elbow (Figure 1, Sheet 2, Item 25), upper radiator hose (Figure 1, Sheet 2, Item 24), two hose clamps (Figure 1, Sheet 2, Item 23), coolant hose (Figure 1, Sheet 2, Item 22), and two hose clamps (Figure 1, Sheet 2, Item 21).

6. At left side of engine, install manifold in tube (Figure 1, Sheet 2, Item 20), two bellows (Figure 1, Sheet 2, Item 19) and eight hose clamps (Figure 1, Sheet 2, Item 18).

7. At lower right side of radiator (Figure 1, Sheet 1, Item 6), install 90 degree elbow (Figure 1, Sheet 1, Item 17), nipple (Figure 1, Sheet 1, Item 16), drain valve (Figure 1, Sheet 1, Item 2), 90 degree elbow (Figure 1, Sheet 1, Item 15), and female connector (Figure 1, Sheet 1, Item 14).

8. Connect coolant hose (Figure 1, Sheet 1, Item 13) to female connector (Figure 1, Sheet 1, Item 14) and install hose clamp (Figure 1, Sheet 1, Item 12).

9. Install lower radiator hose (Figure 1, Sheet 1, Item 11) and two hose clamps (Figure 1, Sheet 1, Item 10).

10. On right side of engine, install manifold out tube (Figure 1, Sheet 1, Item 9), two bellows (Figure 1, Sheet 1, Item 8), and eight hose clamps (Figure 1, Sheet 1, Item 7).

11. Install barbed fitting (Figure 1, Sheet 1, Item 5) on radiator (Figure 1, Sheet 1, Item 6), connect hose (Figure 1, Sheet 1, Item 4), and install hose clamp (Figure 1, Sheet 1, Item 3).

12. Install document box above right front door assembly (latch).

INSTALLATION - Continued

13. Install sill on upper edge of left front door assembly (latch) opening.
14. Close left front door and right front doors.
15. Install fan guards, shrouds, and upper and lower shroud plates (WP 0066).
16. Install engine generator compartment ceiling assembly (WP 0032).
17. Install exhaust system (WP 0069).
18. Install rear roof section housing assembly (WP 0031).
19. Install front roof section housing assembly (WP 0030).

NOTE

Coolant system capacity is 38 quarts (34.5 liters).

20. Close drain valves (Figure 1, Sheet 1, Item 1) and (Figure 1, Sheet 1, Item 2). Refill cooling system with coolant. Add coolant as required.
21. Set Battery Disconnect Switch to ON and DEAD CRANK SWITCH to ON. On EMCP set ENGINE CONTROL switch to START.
22. With engine running, check for leaks.

END OF TASK

FLUSHING

For flushing of the cooling system, refer to procedures in TM 750-254, Cooling Systems: Tactical Vehicles.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
EXHAUST SYSTEM MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Materials/Parts

Wire, nonelectrical (WP 0124, Item 53)

Personnel Required

Two

References

TM 9-6115-730-24P

Equipment Condition

Access covers removed (WP 0029)
Front roof section housing assembly removed (WP 0030)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

Exhaust system can get very hot. Shut down generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply can cause severe burns and injury to personnel.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

REMOVAL

2. Open left front door and right front door.

WARNING

The muffler blanket is made of fiberglass fabric which can break down with heat and flexing. Fiberglass fibers can irritate the flesh and respiratory passages. Wear protective eyewear, mask, and gloves when removing or installing muffler blanket. Failure to comply can cause injury to personnel.

3. Remove lacing and elbow blanket (Figure 1, Item 1), inlet pipe turbo end blanket (Figure 1, Item 2), inlet pipe muffler end blanket (Figure 1, Item 3), and muffler blanket (Figure 1, Item 4).

4. Remove pipe clamp (Figure 1, Item 5) from exhaust in elbow (Figure 1, Item 6).

5. Remove two exhaust pipe clamps (Figure 1, Item 7) and one ceramic strip (Figure 1, Item 8) that attaches flex exhaust tube assembly (Figure 1, Item 9) to muffler (Figure 1, Item 10) and remove flex exhaust tube assembly (Figure 1, Item 9) from muffler and exhaust in elbow (Figure 1, Item 6).

6. Remove eight locknuts (Figure 1, Item 11), washers (Figure 1, Item 12), and screws (Figure 1, Item 13), and remove exhaust flange (Figure 1, Item 14), exhaust in elbow (Figure 1, Item 6), and bellows (Figure 1, Item 15). Remove clamp (Figure 1, Item 16) and insulation strip (Figure 1, Item 17).

7. Remove two locknuts (Figure 1, Item 18) and washers (Figure 1, Item 19) from each of two muffler tie down strap assemblies (Figure 1, Item 20), and remove straps, clamp (Figure 1, Item 25), and muffler (Figure 1, Item 10).

8. Remove four locknuts (Figure 1, Item 21), washers (Figure 1, Item 22), and screws (Figure 1, Item 23) from each of two muffler brackets (Figure 1, Item 24), and remove two brackets (Figure 1, Item 24) from engine/generator compartment ceiling.

END OF TASK

INSTALLATION

1. Install two brackets (Figure 1, Item 24) to engine/generator compartment ceiling, and secure with four screws (Figure 1, Item 23), washers (Figure 1, Item 22), and locknuts (Figure 1, Item 21).

2. Install muffler (Figure 1, Item 10), clamp (Figure 1, Item 25), two muffler tiedown strap assemblies (Figure 1,Item 20), two washers (Figure 1, Item 19),.and locknuts (Figure 1, Item 18)

3. Install exhaust flange (Figure 1, Item 14) and bellows (Figure 1, Item 15) on exhaust in elbow (Figure 1, Item 6). Install insulation strip (Figure 1, Item 17) and clamp (Figure 1, Item 16). Install eight screws (Figure 1, Item 13), washers (Figure 1, Item 12), and locknuts (Figure 1, Item 11).

INSTALLATION - Continued

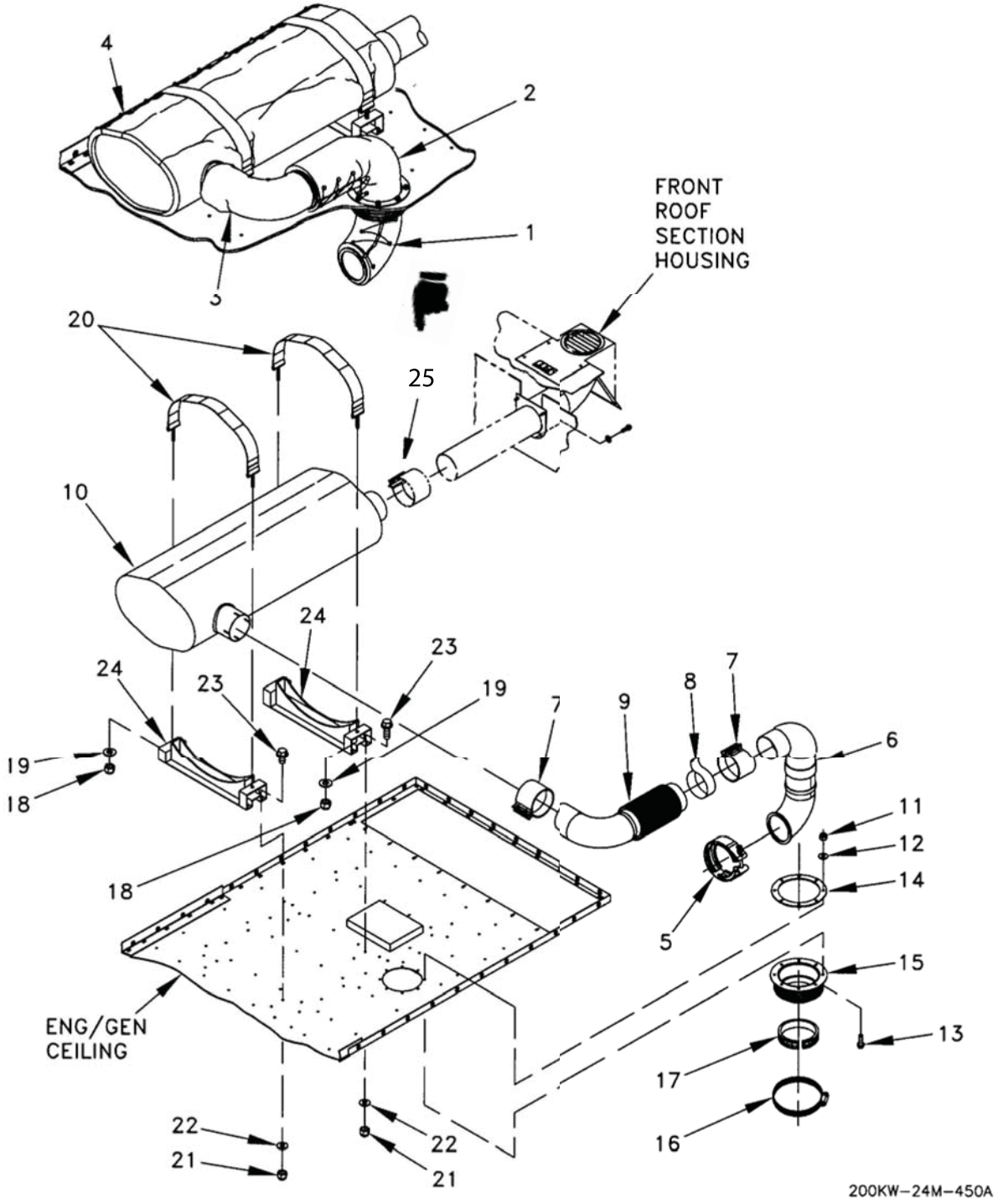

Figure 1. Exhaust System.

INSTALLATION - Continued

4. Install flex exhaust tube assembly (Figure 1, Item 9) on muffler (Figure 1, Item 10) and exhaust in elbow (Figure 1, Item 6) and install ceramic strip (Figure 1, Item 8) and two exhaust pipe clamps (Figure 1, Item 7).

5. Install pipe clamp (Figure 1, Item 5) on exhaust in elbow (Figure 1, Item 6).

WARNING

The muffler blanket is made of fiberglass fabric which can break down with heat and flexing. Fiberglass fibers can irritate the flesh and respiratory passages. Wear protective eyewear, mask, and gloves when removing or installing muffler blanket. Failure to comply can cause injury to personnel.

6. Install muffler blanket (Figure 1, Item 4), inlet pipe muffler end blanket (Figure 1, Item 3), inlet pipe turbo end blanket (Figure 1, Item 2), elbow blanket (Figure 1, Item 1), and secure with lacing.

7. Install front roof section housing assembly (WP 0030).

8. Install access covers (WP 0029).

9. Close left front door and right front door.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

CRANKCASE VENTILATION FILTER MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Personnel Required

One

Materials/Parts

Cap and plug set (WP 0124, Item 6)
Wiping rags (WP 0124, Item 35)

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set, and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the air cleaner system.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Open left rear doors.

3. Disconnect hose (Figure 1, Item 1) and reducer (Figure 1, Item 2) from bottom of crankcase ventilation filter (Figure 1, Item 3).

4. Unlatch bowl (Figure 1, Item 4) from crankcase ventilator filter (Figure 1, Item 3) and remove filter element (Figure 1, Item 5).

END OF TASK

INSTALLATION

1. Install filter element (Figure 1, Item 5) and latch bowl (Figure 1, Item 4) back onto crankcase ventilation filter (Figure 1, Item 3).

2. Install reducer (Figure 1, Item 2) to bottom of crankcase ventilation filter (Figure 1, Item 3) and install hose (Figure 1, Item 1).

3. Close left rear doors.

INSTALLATION - Continued

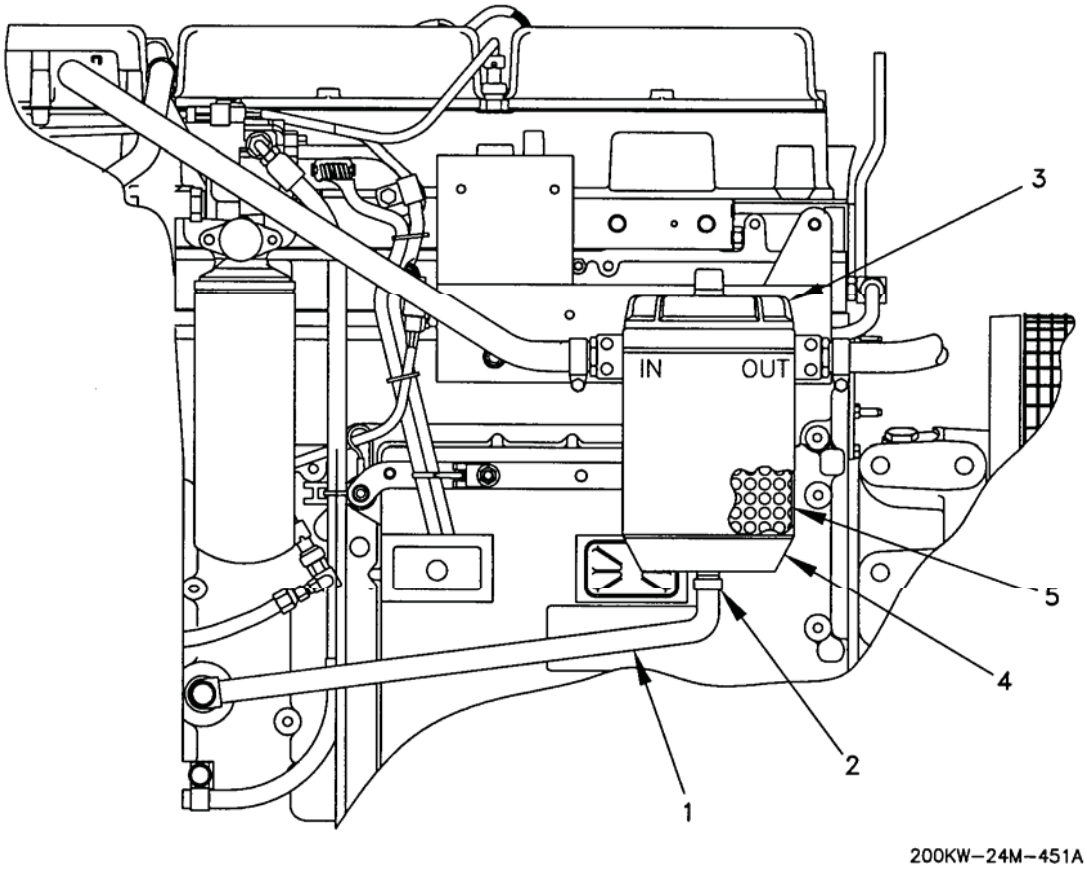

Figure 1. Crankcase Ventilation Filter.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
AIR CLEANER FILTER MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Personnel Required

One

Materials/Parts

Cap and plug set (WP 0124, Item 6)
Filter, inner
Filter, outer
Wiping rags (WP 0124, Item 35)

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set, and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the air cleaner system.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Open left rear doors.

CAUTION

Do not twist filters or damage may occur.

3. Unfasten wing nut (Figure 1, Item 1) and remove outer filter (Figure 1, Item 2) from air cleaner housing (Figure 1, Item 3).

4. Remove C-clip (Figure 1, Item 4).

5. Remove cotter pin (Figure 1, Item 5), indicator nut (Figure 1, Item 6), and inner filter element (Figure 1, Item 7).

6. Reset indicator nut (Figure 1, Item 6) by applying compressed air to rear of the indicator nut while sealing the front opening of nut.

END OF TASK

CLEANING

WARNING

Cleaning with compressed air can cause flying particles. When using compressed air, wear protective glasses and use clean, low pressure air, less than 30 psi (208 kPa). Failure to comply can cause eye injury to personnel.

1. If not excessively dirty, clean filter elements (Figure 1, Item 2) and (Figure 1, Item 7) with low pressure (less than 30 psi) compressed air.

2. Wipe interior of housing (Figure 1, Item 3) with clean lint-free cloth.

3. Replace filter elements when damaged or when they cannot be cleaned.

END OF TASK

INSTALLATION

1. Install inner filter element (Figure 1, Item 7), indicator nut (Figure 1, Item 6), and cotter pin (Figure 1, Item 5).

2. Install C-clip (Figure 1, Item 4), outer filter element (Figure 1, Item 2), and hand tighten wing nut (Figure 1, Item 1).

3. Close left rear doors.

INSTALLATION - Continued

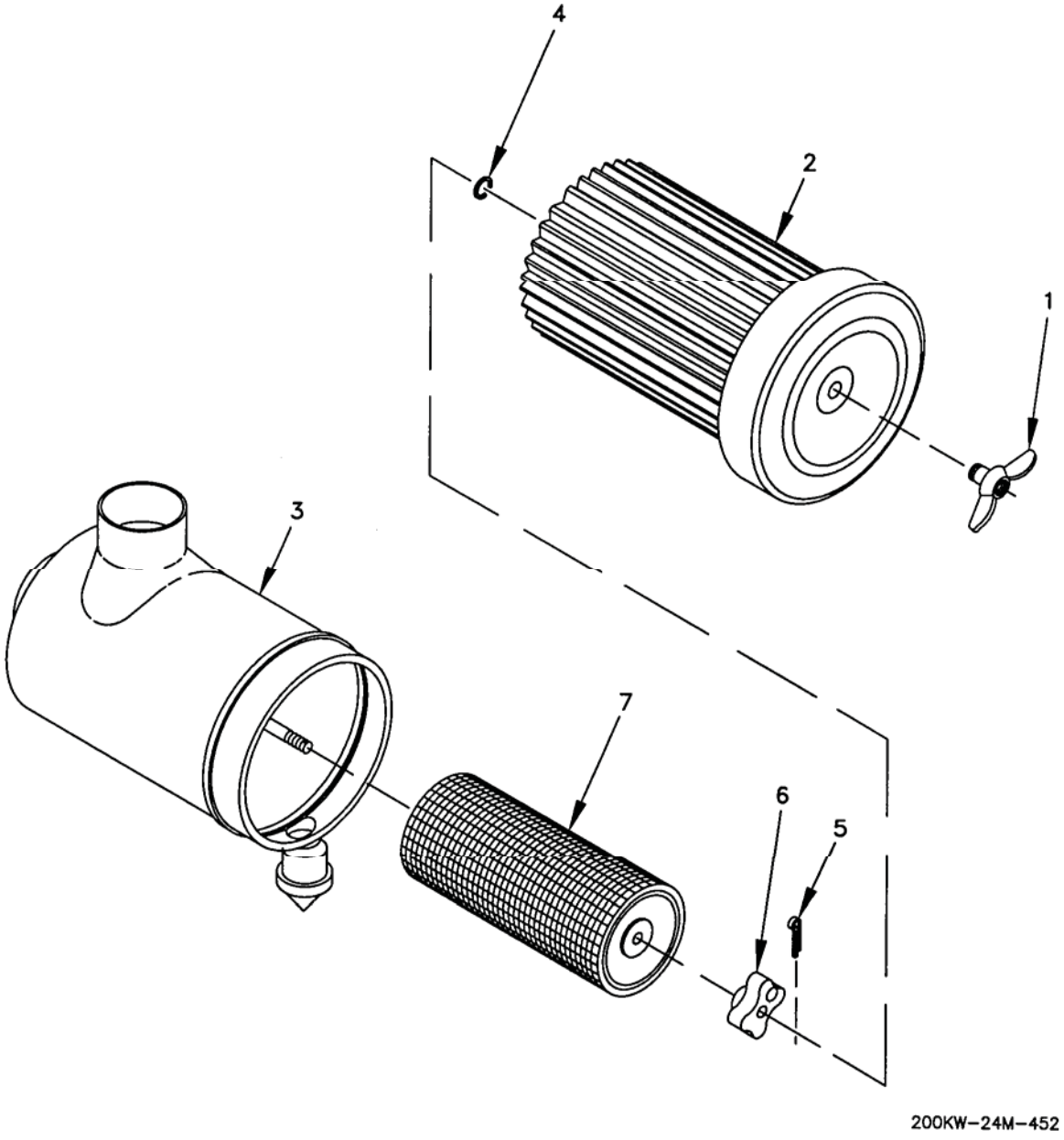

Figure 1. Air Cleaner Filter.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

AIR CLEANER SYSTEM MAINTENANCE

INITIAL SETUP:

Tools and Special Tools	Personnel Required
Tool Kit, General Mechanic's (WP 0123, Item 1)	Two
Materials/Parts	**References**
Cap and plug set (WP 0124, Item 6)	TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set, and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the air cleaner system.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Open right front doors and left front door.

REMOVAL - Continued

3. Remove air cleaner indicator (Figure 1, Sheet 1, Item 1) from air cleaner (Figure 1, Sheet 1, Item 2).

4. Remove two clamps (Figure 1, Sheet 1, Item 3) and (Figure 1, Sheet 1, Item 4) and reducing elbow (Figure 1, Sheet 1, Item 5) from air cleaner (Figure 1, Sheet 1, Item 2) and restricted tap sleeve (Figure 1, Sheet 1, Item 6).

5. Remove sensor (Figure 1, Sheet 1, Item 7) from restricted tap sleeve (Figure 1, Sheet 1, Item 6).

6. Remove two clamps (Figure 1, Sheet 1, Item 8) and hose (Figure 1, Sheet 1, Item 9) from restricted tap sleeve (Figure 1, Sheet 1, Item 6) and OUT port fitting on crankcase ventilation filter (Figure 1, Sheet 2, Item 10).

7. Remove clamp (Figure 1, Sheet 1, Item 11) and disconnect restricted tap sleeve (Figure 1, Sheet 1, Item 6) from air vent hose (Figure 1, Sheet 1, Item 12).

8. Remove clamp (Figure 1, Sheet 1, Item 13) and disconnect air vent hose (Figure 1, Sheet 1, Item 12) from engine turbo.

9. Remove two clamps (Figure 1, Sheet 2, Item 14) and hose (Figure 1, Sheet 2, Item 15) from IN port fitting on crankcase ventilation filter (Figure 1, Sheet 2, Item 10) and engine crankcase filter adapter.

10. Remove two clamps (Figure 1, Sheet 2, Item 16) and disconnect hose (Figure 1, Sheet 2, Item 17) from swivel fitting (Figure 1, Sheet 2, Item 18) on bottom of crankcase ventilation filter (Figure 1, Sheet 2, Item 10) and from check valve (Figure 1, Sheet 2, Item 19) on left hand rear engine dipstick port.

11. Remove check valve (Figure 1, Sheet 2, Item 19) and elbow (Figure 1, Sheet 2, Item 20) from left hand rear engine dipstick port.

12. Remove two screws (Figure 1, Sheet 2, Item 21), lockwashers (Figure 1, Sheet 2, Item 22), washers (Figure 1, Sheet 2, Item 23), and crankcase ventilation filter (Figure 1, Sheet 2, Item 10) from bracket (Figure 1, Sheet 2, Item 24).

WARNING

Air cleaner weighs 66 pounds (30 kg) and requires a two-person lift. Ensure proper lifting techniques are used when lifting air cleaner. Failure to comply can cause injury to personnel.

13. Loosen nut (Figure 1, Sheet 1, Item 25) on each air cleaner mounting band (Figure 1, Sheet 1, Item 26). Remove air cleaner (Figure 1, Sheet 1, Item 2).

14. Loosen captive wing nut (Figure 1, Sheet 1, Item 28) and remove air cleaner cover (Figure 1, Sheet 1, Item 27), and remove air cleaner (Figure 1, Sheet 1, Item 2) from air cleaner mounting bands (Figure 1, Sheet 1, Item 26).

15. Remove four locknuts (Figure 1, Sheet 1, Item 29), washers (Figure 1, Sheet 1, Item 30), screws (Figure 1, Sheet 1, Item 31), and two air cleaner mounting bands (Figure 1, Sheet 1, Item 26).

16. Remove two hose fittings (Figure 1, Sheet 2, Item 32) from crankcase ventilation filter (Figure 1, Sheet 1, Item 10).

REMOVAL - Continued

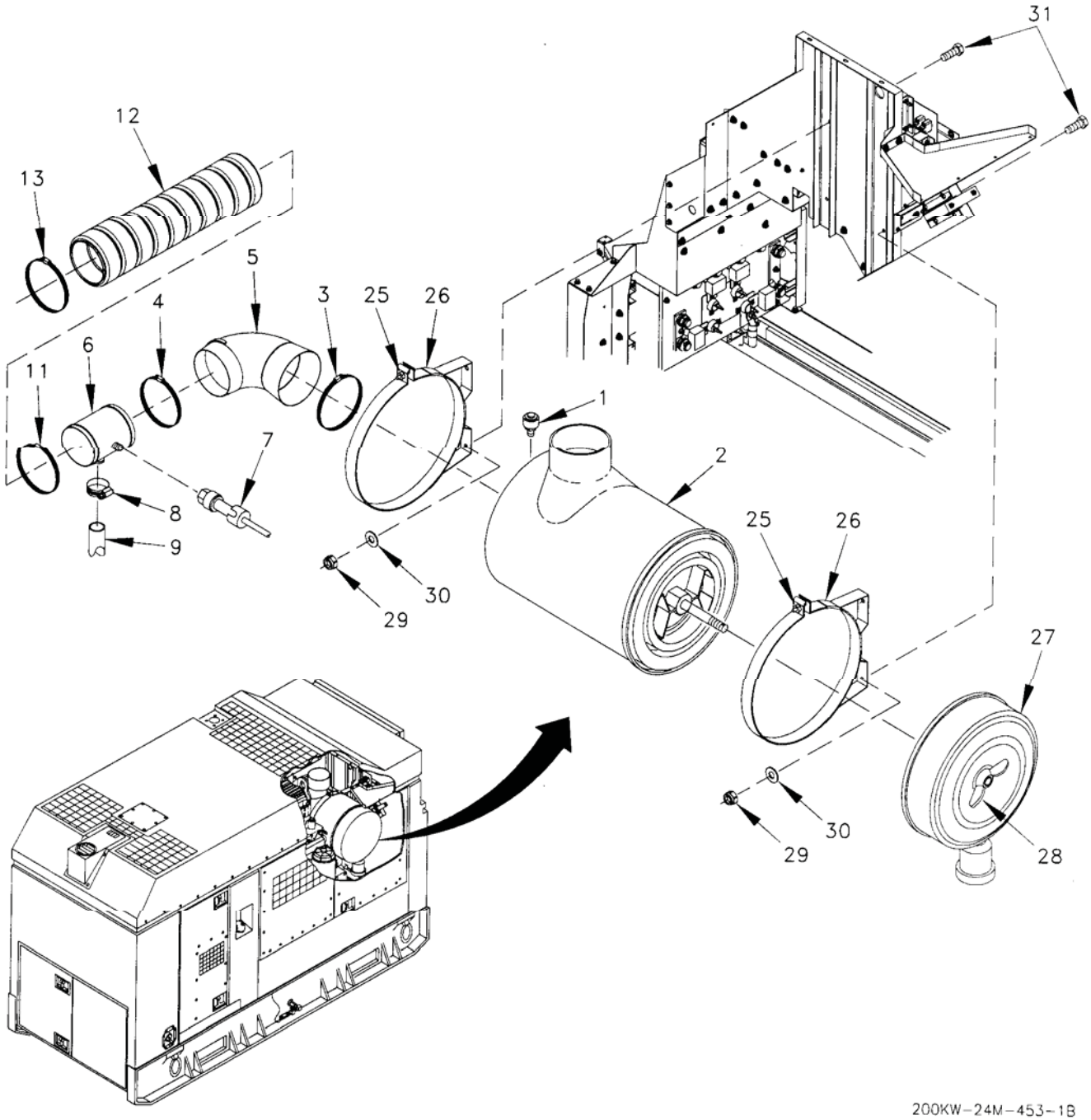

Figure 1. Air Cleaner System (Sheet 1 of 2).

REMOVAL - Continued

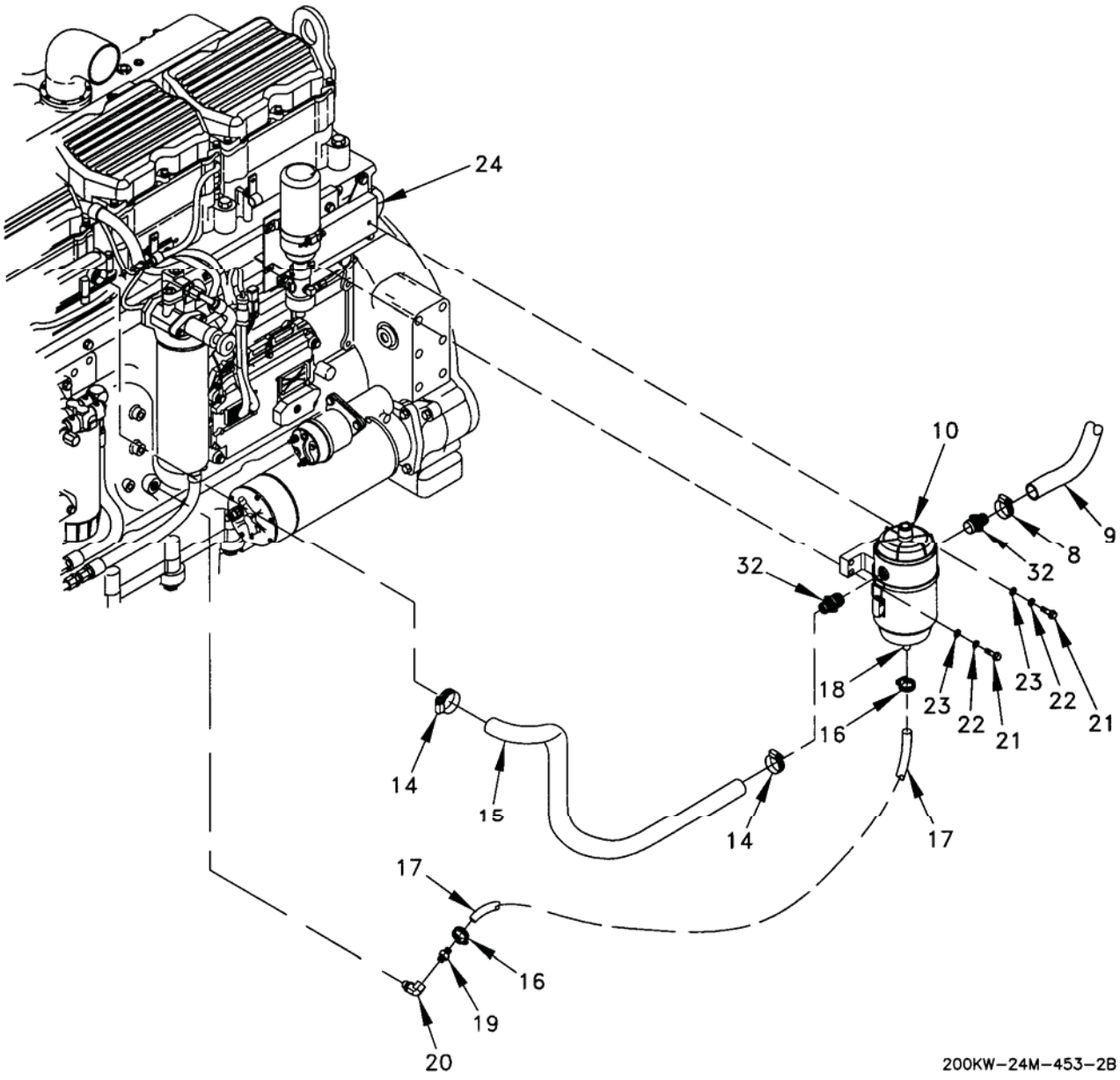

Figure 1. Air Cleaner System (Sheet 2 of 2).

END OF TASK

INSTALLATION

1. Install two hose fittings (Figure 1, Sheet 1, Item 30) to crankcase ventilation filter (Figure 1, Sheet 2, Item 32).

2. Install two air cleaner mounting bands (Figure 1, Sheet 1, Item 26) and secure with four screws (Figure 1, Sheet 1, Item 31), washers (Figure 1, Sheet 1, Item 30), and locknuts (Figure 1, Sheet 1, Item 29).

WARNING

Air cleaner weighs 66 pounds (30 kg) and requires a two-person lift. Ensure proper lifting techniques are used when lifting air cleaner. Failure to comply can cause injury to personnel.

3. Install air cleaner (Figure 1, Sheet 1, Item 2) in two air cleaner mounting bands (Figure 1, Sheet 1, Item 26) and tighten two nuts (Figure 1, Sheet 1, Item 25).

4. Install air cleaner cover (Figure 1, Sheet 1, Item 27) and tighten wing nut (Figure 1, Sheet 1, Item 28).

5. Install crankcase ventilation filter (Figure 1, Sheet 2, Item 10) on bracket (Figure 1, Sheet 2, Item 24) and secure with two screws (Figure 1, Sheet 2, Item 21), lockwashers (Figure 1, Sheet 2, Item 22), and washers (Figure 1, Sheet 2, Item 23).

6. Install elbow (Figure 1, Sheet 2, Item 20) and check valve (Figure 1, Sheet 2, Item 19) in left hand rear engine dipstick port.

7. Connect hose (Figure 1, Sheet 2, Item 17) from swivel fitting (Figure 1, Sheet 2, Item 18) on bottom of crankcase ventilation filter (Figure 1, Sheet 2, Item 10) and to check valve (Figure 1, Sheet 2, Item 19) on left hand rear engine dipstick port, and install two clamps (Figure 1, Sheet 2, Item 16).

8. Connect hose (Figure 1, Sheet 2, Item 15) to IN port fitting on crankcase ventilation filter (Figure 1, Sheet 2, Item 10) and to engine crankcase filter adapter, and install two clamps (Figure 1, Sheet 2, Item 14).

9. Connect air vent hose (Figure 1, Sheet 1, Item 12) to engine turbo and install clamp (Figure 1, Sheet 1, Item 13).

10. Connect restricted tap sleeve (Figure 1, Sheet 1, Item 6) to air vent hose (Figure 1, Sheet 1, Item 12) and install clamp (Figure 1, Sheet 1, Item 11).

11. Connect hose (Figure 1, Sheet 1, Item 9) to restricted tap sleeve (Figure 1, Sheet 1, Item 6) and to OUT port fitting on crankcase ventilation filter (Figure 1, Sheet 2, Item 10), and install two clamps (Figure 1, Sheet 1, Item 8).

12. Install sensor (Figure 1, Sheet 1, Item 7) on restricted tap sleeve (Figure 1, Sheet 1, Item 6).

13. Install reducing elbow (Figure 1, Sheet 1, Item 5) on air cleaner (Figure 1, Sheet 1, Item 2) and restricted tap sleeve (Figure 1, Sheet 1, Item 6) and install two clamps (Figure 1, Sheet 1, Item 4) and (Figure 1, Sheet 1, Item 3).

14. Install air cleaner indicator (Figure 1, Sheet 1, Item 1) on air cleaner (Figure 1, Sheet 1, Item 2).

15. Close left front door and right front doors.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

ETHER INJECTION ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools	Personnel Required
Tool Kit, General Mechanic's (WP 0123, Item 1)	One
Materials/Parts	**References**
Cap and plug set (WP 0124, Item 6)	TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

Breathing ether fumes can cause fainting. Do not manually discharge or deliberately inhale ether. Failure to comply can cause injury to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the ether injector assembly.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.
2. Open left front doors.
3. Disconnect wire harness connector ENG-P13 from injector valve (Figure 1, Item 1).
4. Disconnect tubing (Figure 1, Item 2) from injector valve (Figure 1, Item 1).
5. Loosen clamp (Figure 1, Item 3) and remove ether bottle (Figure 1, Item 4) and immediately install cap (Figure 1, Item 5).
6. If necessary, remove two screws (Figure 1, Item 6), washers (Figure 1, Item 7), and clamp (Figure 1, Item 3).
7. If necessary, remove two screws (Figure 1, Item 12) washers (Figure 1, Item 13), retaining clamp (Figure 1, Item 10) and injector valve (Figure 1, Item 1).
8. If necessary, remove two screws (Figure 1, Item 8), washers (Figure 1, Item 9), and valve mounting bracket (Figure 1, Item 11).

INSTALLATION

1. If removed, install valve mounting bracket (Figure 1, Item 11), two washers (Figure 1, Item 9),and screws (Figure 1, Item 8).
2. If removed, install injector valve (Figure 1, Item 1) and retaining bracket (Figure 1, Item 10) with two washers (Figure 1, Item 13) and screws (Figure 1, Item 12).
3. If removed, install clamp (Figure 1, Item 3), two washers (Figure 1, Item 7), and screws (Figure 1, Item 6).
4. Remove cap (Figure 1, Item 5), and immediately install ether bottle (Figure 1, Item 4). Tighten clamp (Figure 1, Item 3).
5. Connect tubing (Figure 1, Item 2) to injector valve (Figure 1, Item 1).
6. Connect wire harness connector ENG-P13 to injector valve (Figure 1, Item 1).
7. Close left front doors.

INSTALLATION - Continued

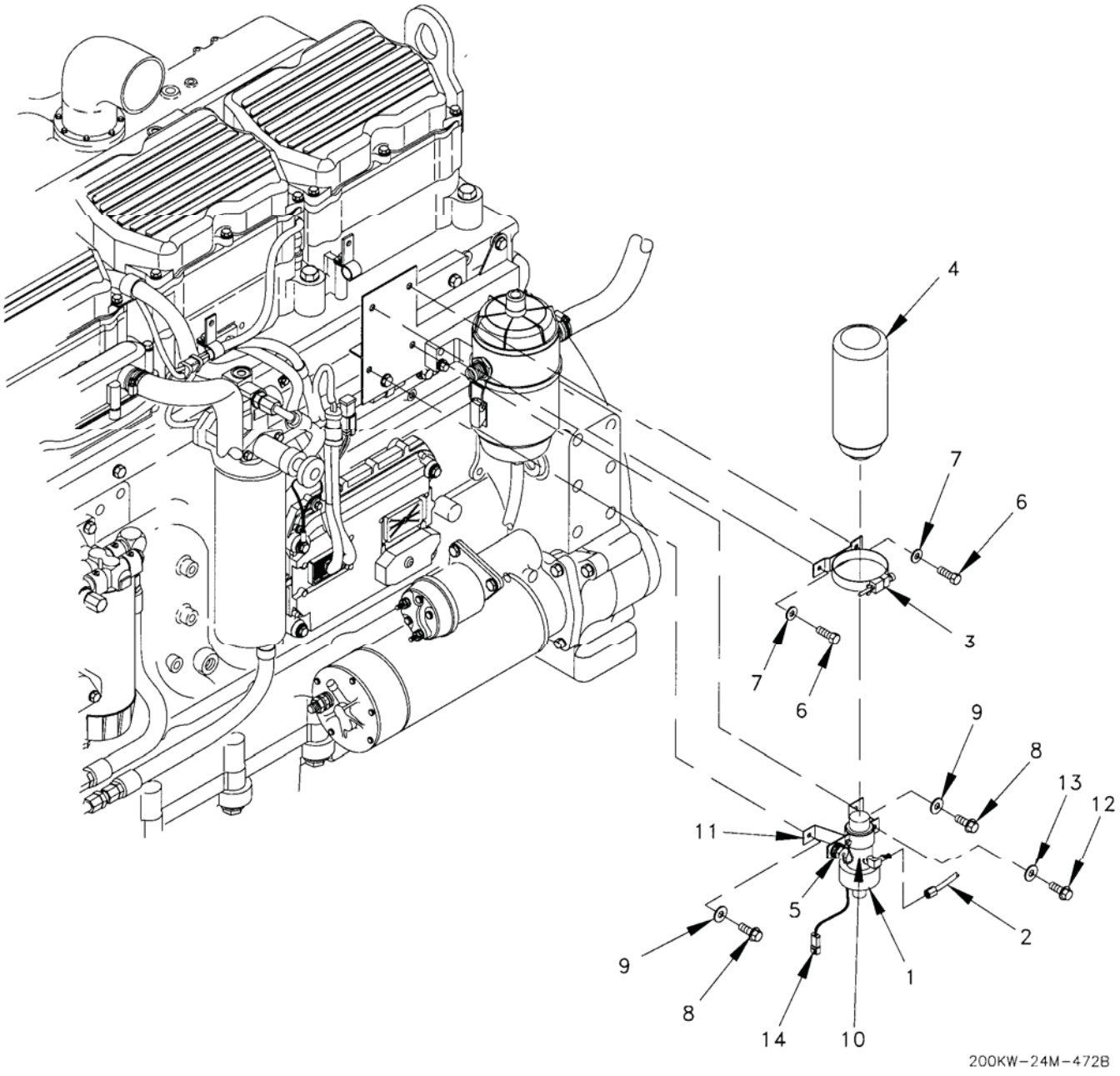

Figure 1. Ether Injection Assembly.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

ALTERNATOR MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Materials/Parts

Marker tags (WP 0124, Item 49)

Personnel Required

One

References

TM 9-6115-730-24P

Equipment Condition

MAN OUT tube removed (WP 0067)
Upper right and lower right fan guards removed (WP 0066)
Remove alternator belts (WP 0075)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set, and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply can cause injury or death to personnel.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.
2. Open right front doors.
3. Tag and disconnect wiring from alternator. Note routing of alternator belts (Figure 1, Item 1).
4. Loosen nut (Figure 1, Item 2) and turn nut (Figure 1, Item 2) counterclockwise (CW) to relieve tension on alternator belts (Figure 1, Item 1) and slip belts off alternator pulley (Figure 1, Item 4).
5. Tag and disconnect wiring from alternator (Figure 1, Item 5).

WARNING

Support alternator when removing attaching hardware or alternator may fall. Failure to comply can cause injury to personnel and equipment damage.

6. While supporting alternator (Figure 1, Item 5), remove nut (Figure 1, Item 6), two washers (Figure 1, Item 7), and bolt (Figure 1, Item 8).
7. Remove bolt (Figure 1, Item 9), washer (Figure 1, Item 10), and alternator (Figure 1, Item 5).

END OF TASK

INSTALLATION

WARNING

Support alternator when removing attaching hardware or alternator may fall. Failure to comply can cause injury to personnel and equipment damage.

1. Install alternator (Figure 1, Item 5) and secure with washer (Figure 1, Item 10) and bolt (Figure 1, Item 9). Tighten bolt.
2. Install bolt (Figure 1, Item 8), two washers (Figure 1, Item 7), and nut (Figure 1, Item 6). Tighten nut.
3. Position alternator belts (Figure 1, Item 1) onto alternator pulley (Figure 1, Item 4), check positioning of belt and turn nut (Figure 1, Item 2) clockwise (CW) to increase tension on belts.
4. Connect wiring to alternator (Figure 1, Item 5).
5. Perform belt tension adjustment.
6. Install upper right and lower right fan guards (WP 0066).
7. Install MAN OUT tube (WP 0067).

INSTALLATION - Continued

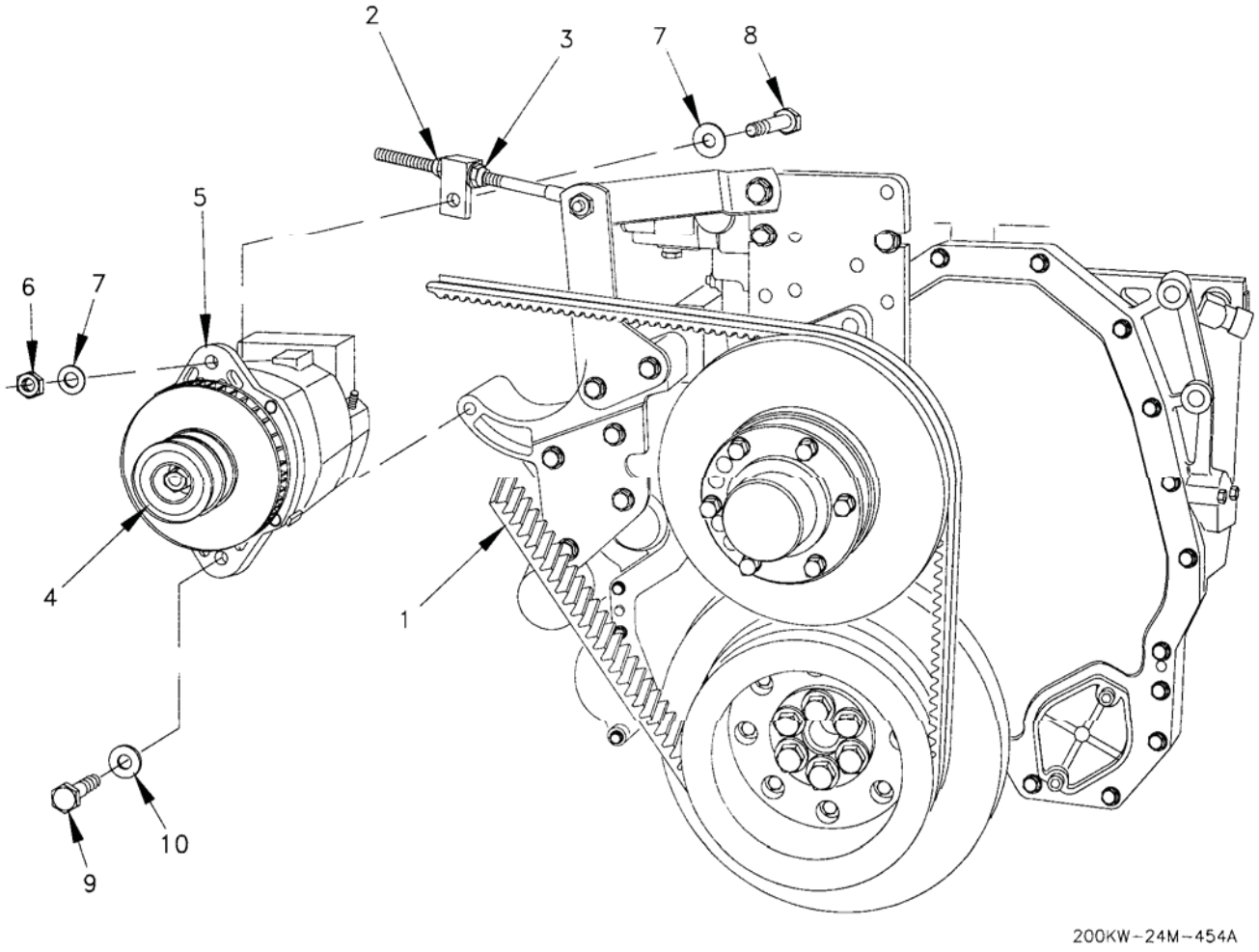

Figure 1. Alternator.

END OF TASK

BELT TENSION ADJUSTMENT

1. Check belt tension on belt (Figure 1, Item 1) farthest from the engine using tension gauge. Tension for new belts should be 155-165 lb (690-734 Nm). For belts which have operated more than 30 minutes, the tension should be 90-110 lb (401-489 Nm).

2. Adjust tension as required by turning nuts (Figure 1, Item 2) and (Figure 1, Item 3) until desired tension is achieved. Tighten nuts (Figure 1, Item 2) and (Figure 1, Item 3) to lock in adjustment.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

ALTERNATOR BELT MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

References

TM 9-6115-730-24P

Materials/Parts

Belt

Equipment Condition

Upper right fan guard removed (WP 0066)

Personnel Required

One

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set, and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply can cause injury or death to personnel.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Open right front doors.

3. Note routing of alternator belts (Figure 1, Item 1).

WARNING

Fan has sharp blades. Use caution and wear gloves when removing or installing belts. Failure to comply can cause injury to personnel.

4. Turn nut (Figure 1, Item 2) counterclockwise (CCW) to relieve tension on alternator belts (Figure 1, Item 1) and slip belts off alternator pulley (Figure 1, Item 3), fan pulley (Figure 1, Item 4), and crankshaft pulley (Figure 1, Item 5).

5. Carefully thread alternator belts (Figure 1, Item 1) over fan blades and remove belts.

END OF TASK

INSTALLATION

WARNING

Fan has sharp blades. Use caution and wear gloves when removing or installing belts. Failure to comply can cause injury to personnel.

1. Carefully thread alternator belts (Figure 1, Item 1) over fan blades.

2. Position alternator belts (Figure 1, Item 1) on crankshaft pulley (Figure 1, Item 5), fan pulley (Figure 1, Item 4) and alternator pulley (Figure 1, Item 3).

3. Turn nut (Figure 1, Item 2) clockwise (CW) to increase belt tension.

4. Perform belt tension adjustment.

INSTALLATION - Continued

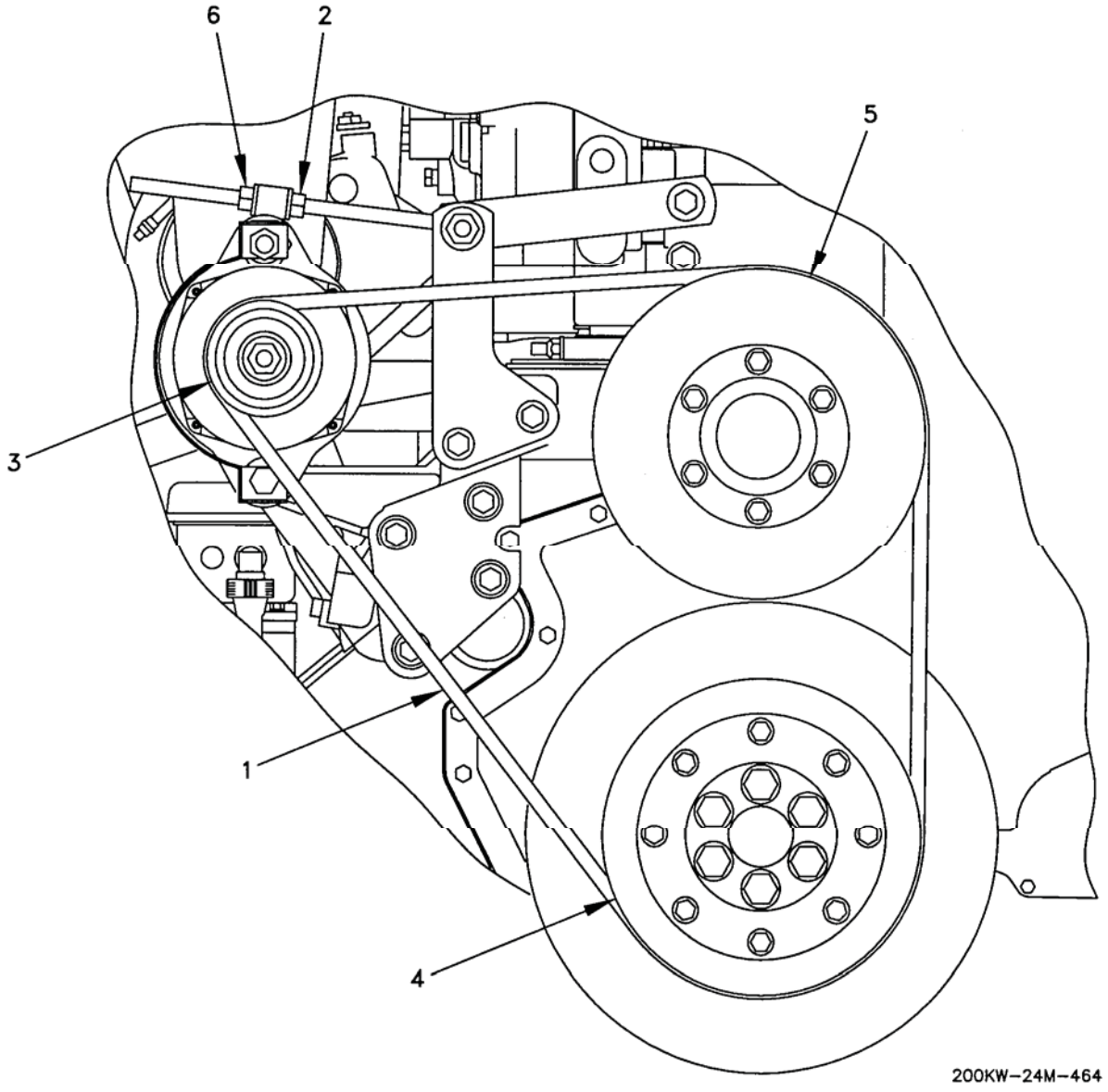

Figure 1. Alternator Belt.

END OF TASK

BELT TENSION ADJUSTMENT

1. Use tension gauge to check tension on belt (Figure 1, Item 1) farthest from the engine. Tension for new belts should be 155-165 lb (690-734 Nm). For belts which have operated more than 30 minutes, the tension should be 90-110 lb (401-489 Nm).

2. Adjust tension as required by turning nut (Figure 1, Item 2) until desired tension is achieved. Tighten nut (Figure 1, Item 6) to lock in adjustment.

3. Install upper right fan guard (WP 0066).

4. Close right front doors.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
STARTER MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Materials/Parts

Gasket
Marker tags (WP 0124, Item 49)

Personnel Required

Two

References

TM 9-6115-730-24P

Equipment Condition

Engine wiring harness connectors ENG-P1 and ENG-P2 disconnected from ECM (WP 0082)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set, and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply can cause injury or death to personnel.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Open left rear doors.

WARNING

Starter weighs 65 pounds (29 kg) and requires a two-person lift. Ensure proper lifting techniques are used when lifting starter. Failure to comply can cause injury to personnel.

3. Tag and disconnect wiring from ground terminal and solenoid on starter (Figure 1, Item 1) and remove cover on starter solenoid.

4. Remove three bolts (Figure 1, Item 2) bottom bolt first, gasket (Figure 1, Item 3), and starter (Figure 1, Item 1).

END OF TASK

INSTALLATION

WARNING

Starter weighs 65 pounds (29 kg) and requires a two-person lift. Ensure proper lifting techniques are used when lifting starter. Failure to comply can cause injury to personnel.

1. Position gasket (Figure 1, Item 3) and starter (Figure 1, Item 1) into flywheel housing, ensure starter gear teeth mesh with flywheel gear teeth, and line up mounting holes. Install three bolts (Figure 1, Item 2). Tighten bolts.

2. Install cover on starter solenoid. Connect engine wiring harness connectors ENG-P1 and ENG-P2 to ECM (WP 0082).

3. Clean electrical contacts if necessary. Connect wiring to starter (Figure 1, Item 1).

4. Close left rear doors.

INSTALLATION - Continued

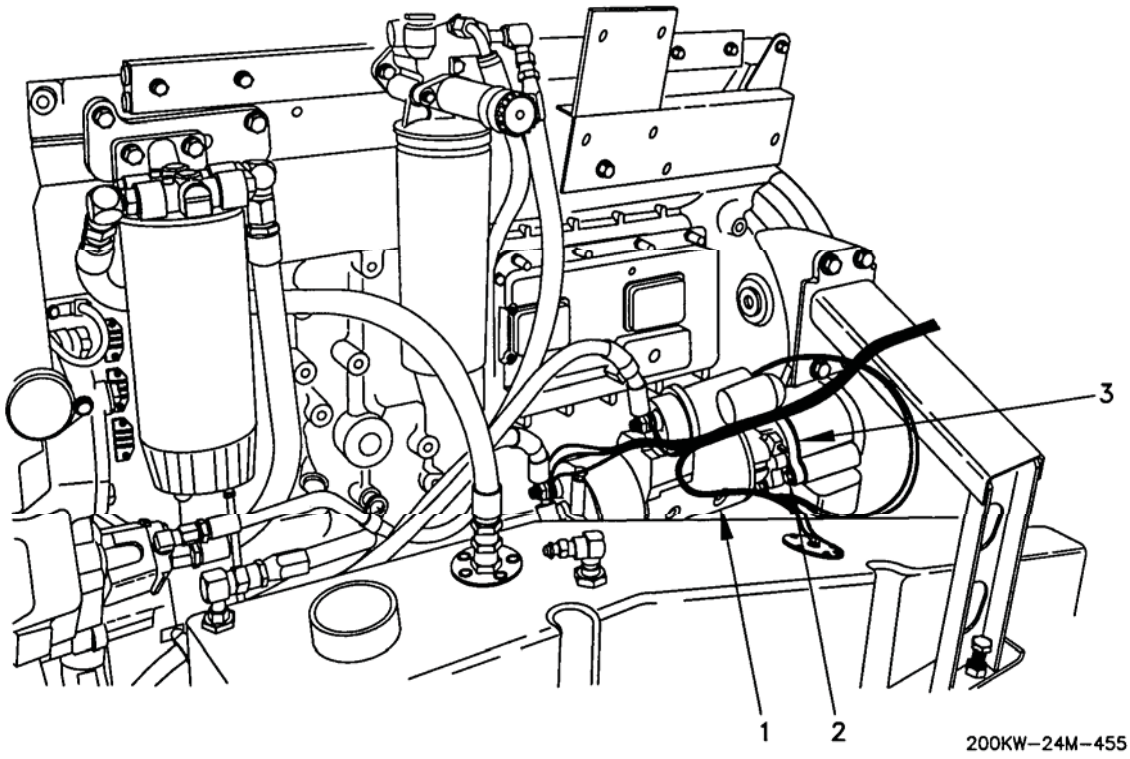

Figure 1. Starter.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

TENSIONER MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0124, Item 1)

References

TM 9-6115-730-24P

Personnel Required

One

Equipment Condition

Upper right fan guard removed (WP 0066)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set, and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply can cause injury or death to personnel.

Fan has sharp blades. Use caution and wear gloves when removing or installing belts. Failure to comply can cause injury to personnel.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.
2. Open right front doors.
3. Note routing of alternator belts (Figure 1, Item 1).
4. Turn nut (Figure 1, Item 2) CCW to relieve tension on alternator belts (Figure 1, Item 1) and slip belt (Figure 1, Item 1) off alternator pulley (Figure 1, Item 3).

WARNING

Support alternator when removing attaching hardware or alternator may fall. Failure to comply can cause injury to personnel and equipment damage.

5. While supporting alternator (Figure 1, Item 4), remove nut (Figure 1, Item 5), two washers (Figure 1, Item 6), and bolt (Figure 1, Item 7).
6. Remove bolt (Figure 1, Item 8), washer (Figure 1, Item 9), and rod (Figure 1, Item 10).
7. Remove nut (Figure 1, Item 11), two washers (Figure 1, Item 12), block (Figure 1, Item 13), and nut (Figure 1, Item 2) from rod (Figure 1, Item 10).

END OF TASK

INSTALLATION

1. Install nut (Figure 1, Item 2), block (Figure 1, Item 13), two washers (Figure 1, Item 12), and nut (Figure 1, Item 11) on rod (Figure 1, Item 10).
2. Install rod (Figure 1, Item 10) and secure with washer (Figure 1, Item 9) and bolt (Figure 1, Item 8). Tighten bolt.

WARNING

Support alternator when removing attaching hardware or alternator may fall. Failure to comply can cause injury to personnel and equipment damage.

3. Support alternator (Figure 1, Item 4) in place and install block (Figure 1, Item 13) over alternator mounting hole and install bolt (Figure 1, Item 7), two washers (Figure 1, Item 6), and nut (Figure 1, Item 5). Tighten nut.
4. Slip alternator belts (Figure 1, Item 1) over pulleys and tighten nut (Figure 1, Item 2) CW to tighten belt.
5. Perform belt tension adjustment (WP 0075).
6. Install upper right fan guard (WP 0066).
7. Close right front doors.

INSTALLATION - Continued

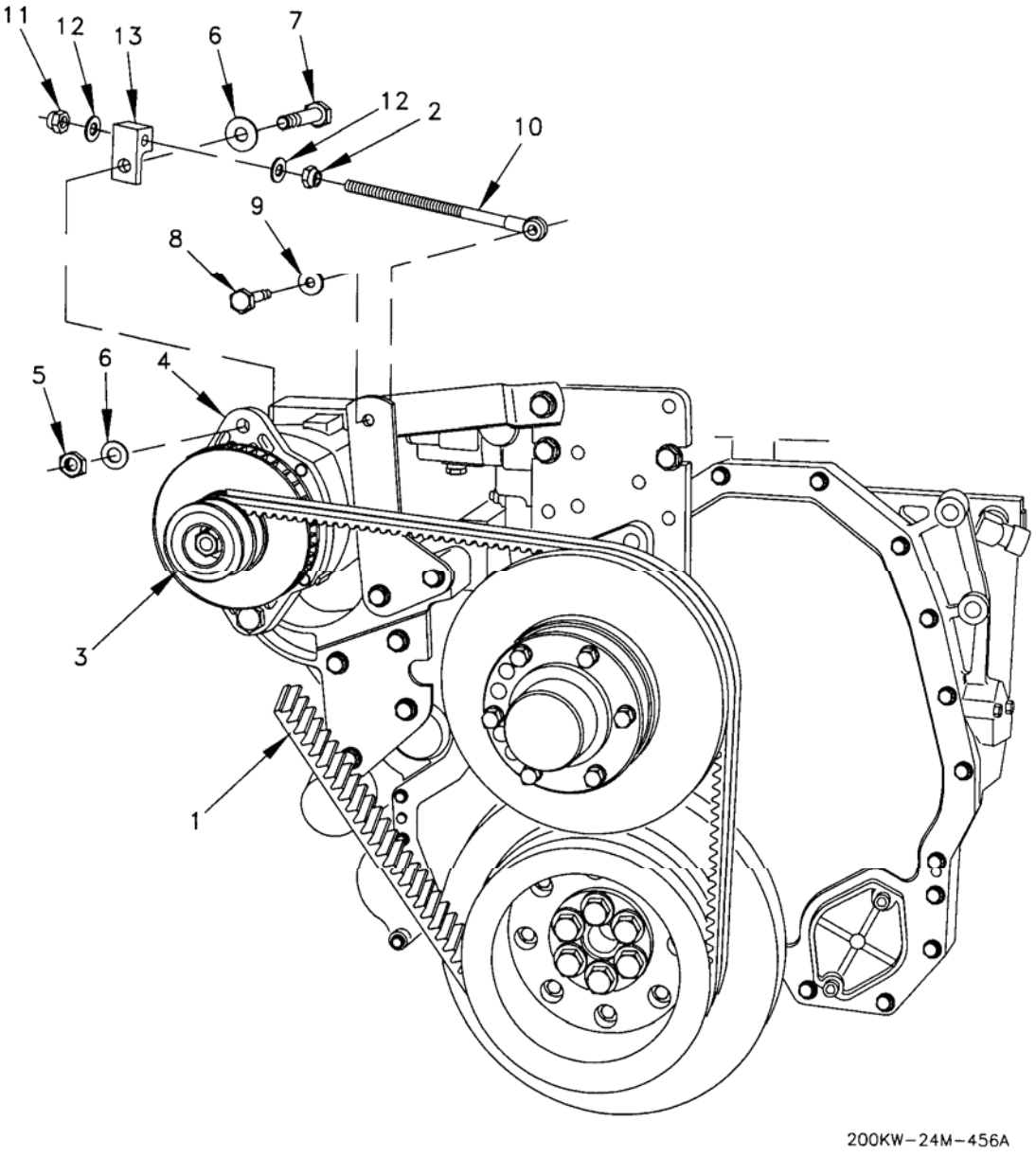

Figure 1. Tensioner.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

FUEL PRIMING PUMP MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Personnel Required

One

Materials/Parts

Gasket
Wiping rags (WP 0124, Item 35)

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Failure to comply can cause injury or death to personnel.

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set, and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply can cause injury or death to personnel.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Open left rear doors.

3. Remove bolt (Figure 1, Item 1), washer (Figure 1, Item 2), bolt (Figure 1, Item 3), washer (Figure 1, Item 4), fuel priming pump (Figure 1, Item 5), and gasket (Figure 1, Item 6).

END OF TASK

INSTALLATION

1. Clean area where gasket (Figure 1, Item 6) will mate with engine.

2. Apply a light coat of fuel to gasket and install gasket (Figure 1, Item 6), fuel priming pump (Figure 1, Item 5), washers (Figure 1, Item 4), bolt (Figure 1, Item 3), washer (Figure 1, Item 2), and bolt (Figure 1, Item 1). Tighten bolts.

3. Close left rear doors.

INSTALLATION - Continued

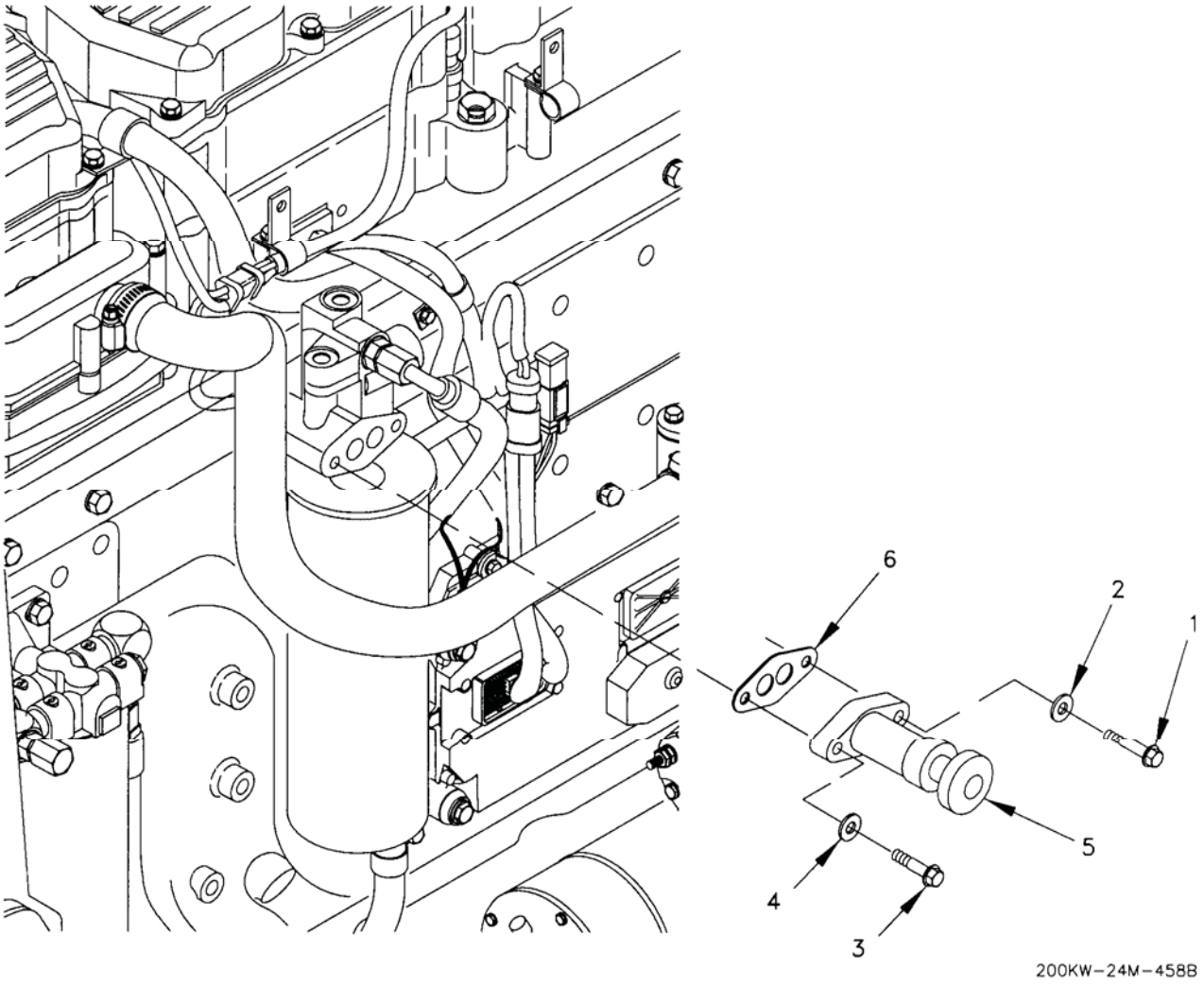

Figure 1. Fuel Priming Pump.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

OIL FILTER MAINTENANCE AND OIL CHANGE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Tool Kit, General Mechanic's (WP 0123, Item 1)

Materials/Parts

Lubricating oil (WP 0124, Items 23-30)
Oil filter
Seal
Wiping rags (WP 0124, Item 35)

Personnel Required

One

References

WP 0016
TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set, and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply can cause injury or death to personnel.

FILTER REMOVAL AND OIL DRAIN

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

CAUTION

Do not drain oil when engine is cold. When engine is cold, oil contaminants are not suspended in the oil and will not be removed during the draining process. This will allow contaminants to remain in oil and will cause equipment damage.

2. Allow engine to cool for approximately 10 minutes.

3. Open right front doors and left front door.

NOTE

Engine oil system capacity is 38 quarts (36 liters).

4. Place suitable container under oil drain on lower front left side of TQG, near slave receptacle.

5. Remove plug (Figure 1, Item 1) from oil drain.

6. Open oil drain valve (Figure 1, Item 2) at lower right side of oil pan and allow oil to drain from system.

7. Remove oil filter (Figure 1, Item 3), using strap wrench if necessary.

8. On right side of engine, opposite drain valve, remove magnetic plug (Figure 1, Item 4) and seal (Figure 1, Item 5) from oil pan. Check magnetic plug for metal particles. Wipe off magnetic plug.

NOTE

If metal particles are found on the magnetic plug, notify supervisor.

END OF TASK

FILTER INSTALLATION AND OIL FILL

1. Install seal (Figure 1, Item 5) and magnetic plug (Figure 1, Item 4).

2. Clean area where filter mounts.

3. Apply thin coat of oil on rubber seal (Figure 1, Item 6) of new oil filter (Figure 1, Item 3).

4. Install oil filter (Figure 1, Item 3) by hand until seal (Figure 1, Item 6) contacts base, then tighten another ¾ turn.

5. Close drain valve (Figure 1, Item 2) and install plug (Figure 1, Item 1) in oil drain.

NOTE

Engine oil system capacity is 38 quarts (36 liters).

6. Remove oil filler cap (Figure 1, Item 7) on right front of engine. Refill with oil (WP 0016 for proper oil). Install oil filler cap (Figure 1, Item 7).

FILTER INSTALLATION AND OIL FILL - Continued

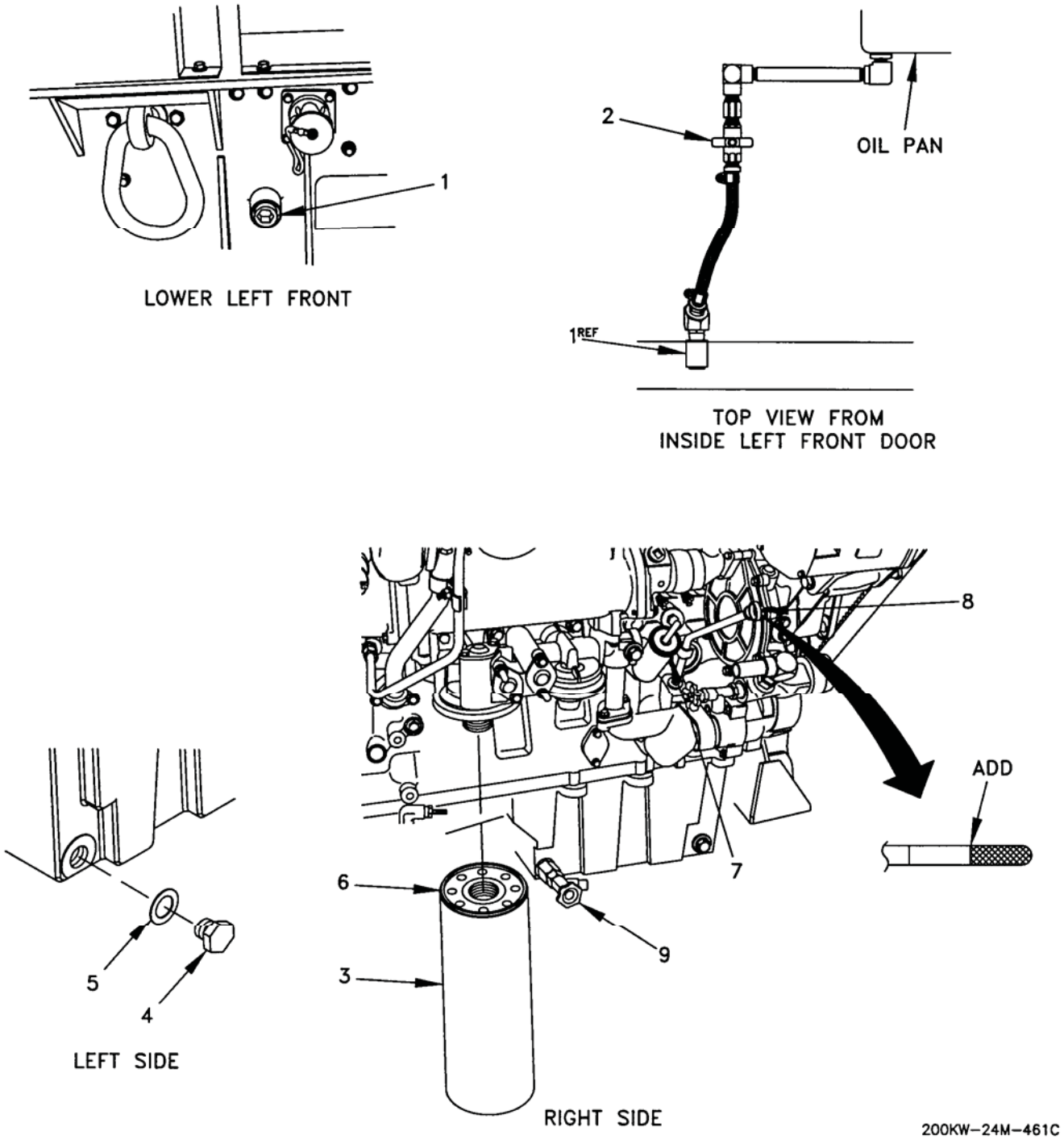

Figure 1. Oil Filter Maintenance and Oil Change.

FILTER INSTALLATION AND OIL FILL - Continued

7. Check dipstick (Figure 1, Item 8) for correct oil level.

8. Set Battery Disconnect Switch to ON. Set DEAD CRANK SWITCH to NORMAL. On EMCP set ENGINE CONTROL switch to COOL DOWN/STOP.

9. Reset CATSW2 (RESET SW OIL) switch inside left rear door.

WARNING

Operating the generator set with any access door open exposes personnel to a high noise level. Hearing protection must be worn when operating or working near the generator set with any access door open. Failure to comply can cause hearing damage to personnel.

10. Operate engine and check for leaks.

11. Check dipstick for correct oil level.

12. Close right front doors and left front door.

END OF TASK

OIL SAMPLING

CAUTION

Do not sample oil when engine is cold. When engine is cold, oil contaminants are not suspended in the oil and a true representative sample of the oil will not be obtained. This may cause equipment damage.

NOTE

Oil sampling is performed in accordance with AOAP requirements and processes.

1. Allow engine to cool for approximately 10 minutes.

2. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

3. Open right front door assembly.

4. Open oil drain valve (Figure 1, Item 9) on right side of engine below oil filter, collect oil sample, and close drain valve.

5. Close right front door assembly (latch).

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

FUEL FILTER MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)
Filter Wrench

Materials/Parts

Diesel fuel (WP 0124, Item 16, 17, 51, or 52)
Wiping rags (WP 0124, Item 35)

Personnel Required

One

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Failure to comply can cause injury or death to personnel.

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set, and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the engine.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.
2. Open left door.
3. Place suitable container under fuel filter (Figure 1, Item 1) to retain spillage.
4. Remove fuel filter (Figure 1, Item 1).

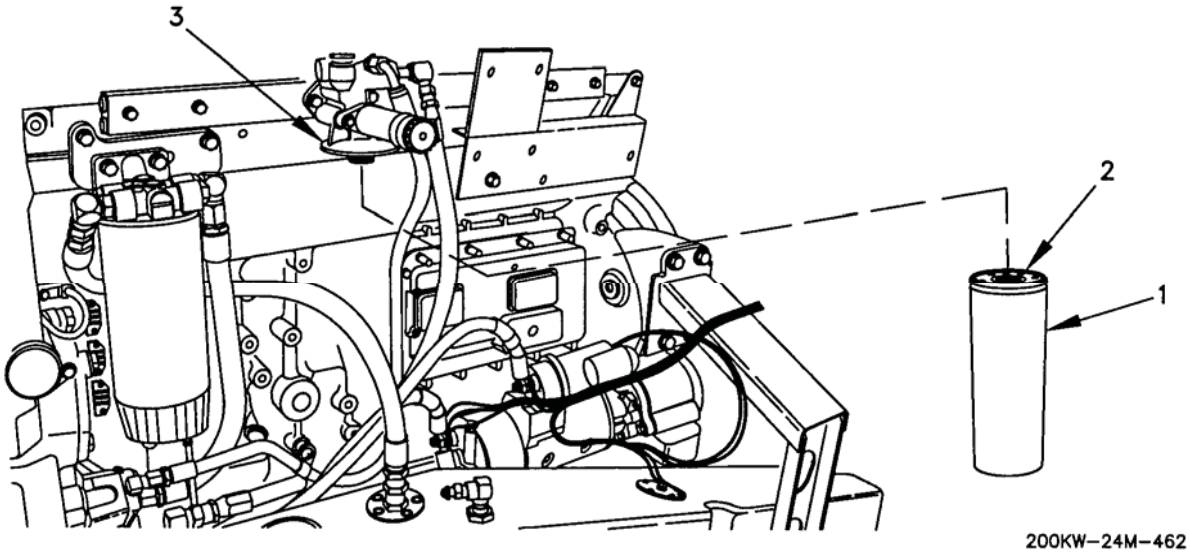

Figure 1. Fuel Filter.

END OF TASK

INSTALLATION

1. Clean area where fuel filter (Figure 1, Item 1) will mate with fuel filter base (Figure 1, Item 3).
2. Apply light coat of fuel to seal (Figure 1, Item 2).
3. Install fuel filter (Figure 1, Item 1) by hand until seal (Figure 1, Item 2) contacts fuel filter base. Turn an additional 3/4 turn by hand.
4. Reset CAT SW1 FUEL FILTER RESET switch inside left rear door.

INSTALLATION - Continued

5. Operate fuel priming pump (Figure 1, Item 4) until strong pressure is felt.

WARNING

Operating the generator set with any access door open exposes personnel to a high noise level. Hearing protection must be worn when operating or working near the generator set with any access door open. Failure to comply can cause hearing damage to personnel.

6. Operate engine and check for leaks.

7. Close left front door.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

THERMOSTAT MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Tool Kit, General Mechanic's (WP 0123, Item 1)

Materials/Parts

Antifreeze (WP 0124 Item 5)
Cap and plug set (WP 0124, Item 6)
Gasket
Seal (2)
Thermostat
Wiping rags (WP 0124, Item 35)

Personnel Required

One

References

TM 9-6115-730-24P

Equipment Condition

Remove alternator (WP 0074)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/ or liquids can result in burns and scalding. Shut down generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the engine.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.
2. Open right front doors.
3. Place suitable container under coolant drain on right front side of TQG. Open drain valve (Figure 1, Item 1) on lower right front of engine, below radiator, and drain approximately 2 gallons (7.5 L) of coolant. Save coolant for refilling system.
4. For optional winterization kit only, loosen hose clamp (Figure 1, Item 2) and disconnect hose (Figure 1, Item 3) and remove valve (Figure 1, item 4).
5. If optional winterization kit is not present, remove three plugs (Figure 1, item 5) if necessary.
6. Loosen hose clamp (Figure 1, Item 6) and disconnect hose (Figure 1, Item 7).
7. Remove two bolts (Figure 1, Item 8) and washers (Figure 1, Item 9).
8. Remove four plain studs (Figure 1, Item 10), washers (Figure 1, item 11), and thermostat housing (Figure 1, Item 12).
9. Remove two thermostats (Figure 1, Item 13), seals (Figure 1, Item 14), and gasket (Figure 1, Item 15).

END OF TASK

INSTALLATION

1. Install two seals (Figure 1, Item 14) into thermostat housing (Figure 1, Item 12) with lips toward inside of housing. Moisten seals (Figure 1, Item 14) with small amount of coolant mixture.
2. Install two thermostats (Figure 1, Item 13), large side first, into thermostat housing (Figure 1, Item 12).
3. Position gasket (Figure 1, Item 15) onto thermostat housing (Figure 1, item 12) and install thermostat housing with two washers (Figure 1, item 9) and bolts (Figure 1, item 8). Tighten bolts.
4. Install four washers (Figure 1, Item 11) and plain studs (Figure 1, Item 10). Tighten studs.
5. Connect hose (Figure 1, Item 7) and tighten hose clamp (Figure 1, Item 6).
6. If optional winterization kit is not present, install three plugs (Figure 1, item 5) if required.
7. For optional winterization kit only, install valve (Figure 1, item 4), connect hose (Figure 1, Item 3) and tighten hose clamp (Figure 1, Item 2).

INSTALLATION - Continued

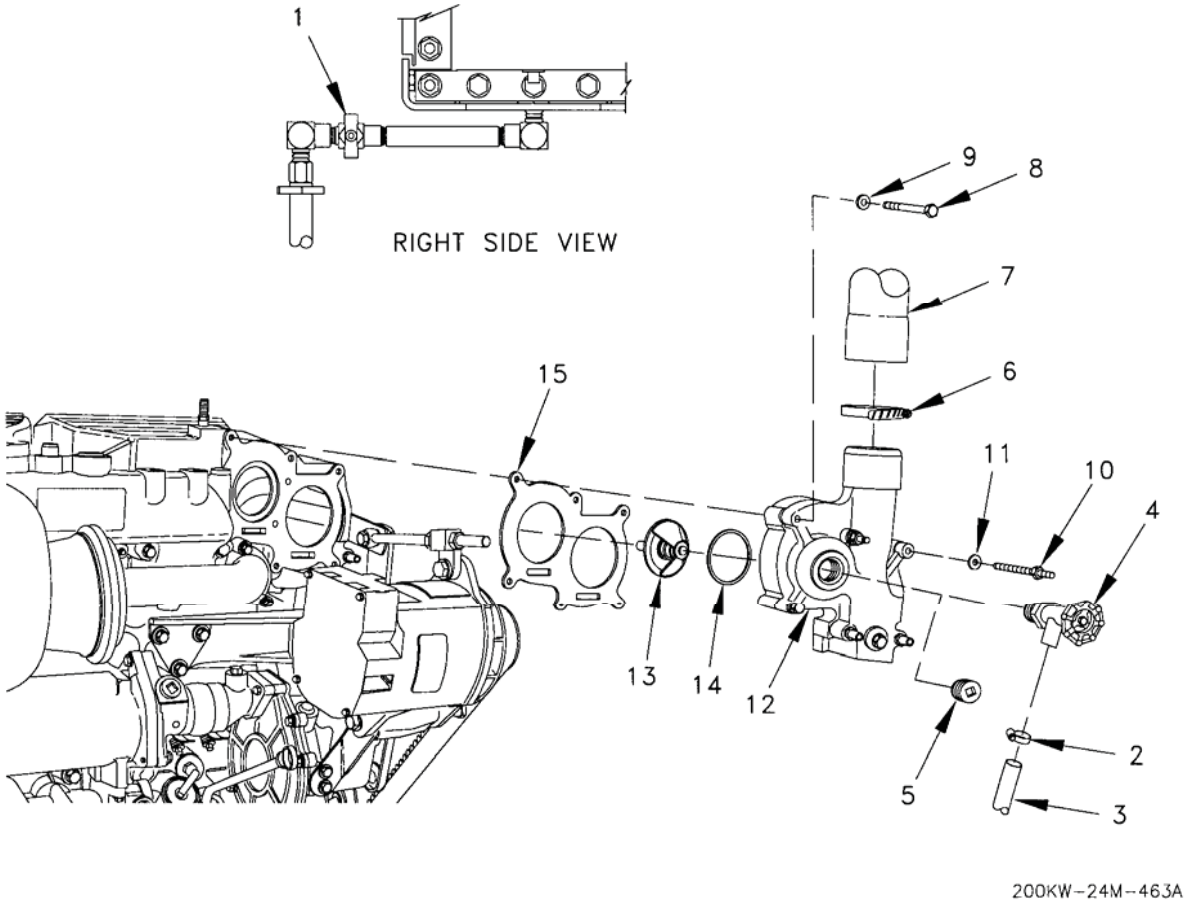

Figure 1. Thermostat.

8. Close drain valve (Figure 1, Item 1).

9. Refill cooling system with coolant that was drained out.

WARNING

Operating the generator set with any access door open exposes personnel to a high noise level. Hearing protection must be worn when operating or working near the generator set with any access door open. Failure to comply can cause hearing damage to personnel.

10. Operate engine and check for leaks.

11. Close right front doors.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

ENGINE CONTROL MODULE MAINTENANCE

INITIAL SETUP:

Tools and Special Tools	Personnel Required
Tool Kit, General Mechanic's (WP 0123, Item 1)	Two
Materials/Parts	**References**
Tiedown straps (WP 0124, Item 46)	TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set, and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply can cause injury or death to personnel.

REMOVAL

1. Refer to WP 0013, SYMPTOM 13 to copy the configuration data from the old ECM.

2. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF/RESET, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

3. Open left front door and left rear doors.

NOTE

Cut tiedown straps as required.

4. Tag and disconnect engine harness connector J2/ENG-P2 (Figure 1, Item 1) and vehicle harness connector J1/ENG-P1 (Figure 1, Item 2) from engine control module (Figure 1, Item 3).

5. Remove two nuts (Figure 1, Item 4), two washers (Figure 1, Item 5), plate (Figure 1, Item 6), three stud bolts (Figure 1, Item 7), three washers (Figure 1, Item 8), three washers (Figure 1, Item 9), three mounts (Figure 1, Item 10), and three spacers (Figure 1, Item 11).

6. Remove bolt (Figure 1, Item 12), washer (Figure 1, Item 13), clip (Figure 1, Item 14), washer (Figure 1, Item 9), mount (Figure 1, Item 10), spacer (Figure 1, Item 11), and engine control module (Figure 1, Item 3).

7. Remove nut (Figure 1, Item 15), washer (Figure 1, Item 16), strap (Figure 1, Item 17), and clip (Figure 1, Item 18).

END OF TASK

INSTALLATION

1. Install clip (Figure 1, Item 18), strap (Figure 1, Item 17), washer (Figure 1, Item 16), and nut (Figure 1, Item 15) on plate (Figure 1, Item 6).

2. Install engine control module (Figure 1, Item 3), spacer (Figure 1, Item 11), mount (Figure 1, Item 10), washer (Figure 1, Item 9), clip (Figure 1, Item 14), washer (Figure 1, Item 13), and bolt (Figure 1, Item 12).

3. Install three spacers (Figure 1, Item 11), three mounts (Figure 1, Item 10), three washers (Figure 1, Item 9), three washers (Figure 1, Item 8), three studbolts (Figure 1, Item 7), plate (Figure 1, Item 6), two washers (Figure 1, Item 5), and two nuts (Figure 1, Item 4).

4. Install vehicle harness connector J1/ENG-P1 (Figure 1, Item 2) and engine harness connector J2/ENG-P2 (Figure 1, Item 1). Torque allen head screws on J1/ENG-P1 and J2/ENG-P2 ECM connectors to 55 +13.0 -4.0 lb. in. (6.0 +1.5 -0.5 Nm)

5. Close left rear doors and left front door.

6. Refer to WP 0013, SYMPTOM 9 to flash program the flash file into the ECM.

7. Refer to WP 0013, SYMPTOM 13 to copy the configuration data into the ECM.

8. Refer to WP 0013, SYMPTOM 8 to calibrate the engine timing sensors.

9. Refer to WP 0013 SYMPTOM 12 to load the injector codes.

INSTALLATION - Continued

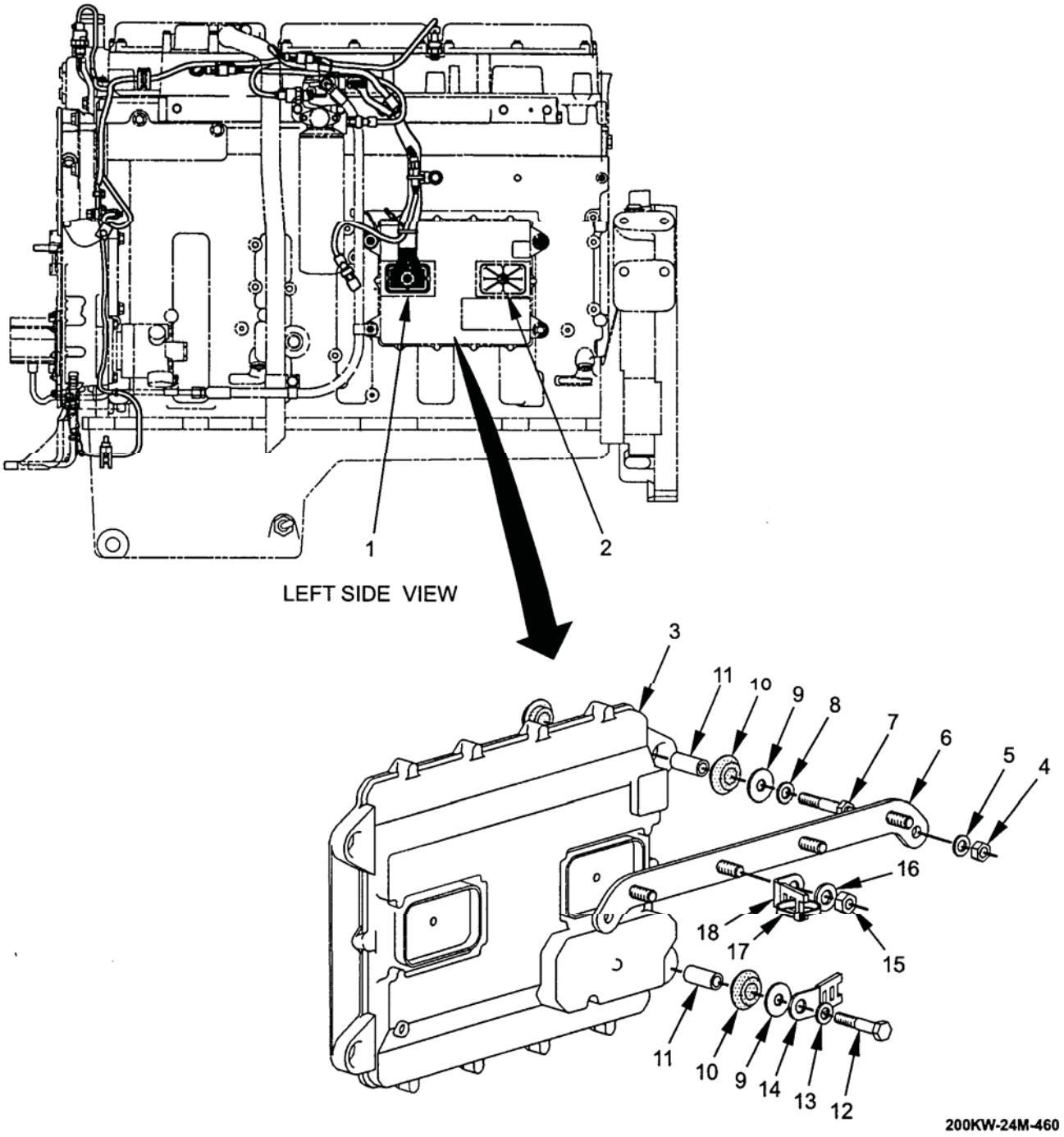

Figure 1. Engine Control Module.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

REPROGRAMMING

INITIAL SETUP:

Personnel Required

One

Equipment Condition

TQG is not operating and powered down

References

WP 0014

REPROGRAMMING DVR PARAMETERS FOR VOLTAGE AND FREQUENCY CHANGE

The following procedure is used if the voltage and frequency settings for the generator set must be changed because of mission requirements. When that occurs, the reconnection board must be repositioned (WP 0014) and the DVR must be reprogrammed for specified frequency and voltage.

1. Set Battery Disconnect Switch to ON.
2. Set DEAD CRANK SWITCH to NORMAL.
3. On EMCP, set ENGINE CONTROL switch to COOL DOWN/STOP.
4. Select reprogramming data from Table 1 below according to the desired output voltage and desired frequency. Mission requirements will define requirements. Note: All 6 of the DVR PARAMETERS must be changed and verified.

Table 1. 200 kW TQG DVR Voltage and Frequency Programming Parameters and Setpoints.

DESIRED OUTPUT		DVR PARAMETER NUMBER					
VOLTS	**HERTZ**	**:01**	**:02**	**:03**	**:04**	**:05**	**:06**
120/208	60	217	1.0	0	694	4.34	58.8
120/208	50	205	1.0	0	578	3.61	49.8
240/416	60	434	2.0	0	347	4.34	58.8
240/416	50	410	2.0	0	289	3.61	49.8

REPROGRAMMING DVR PARAMETERS FOR VOLTAGE AND FREQUENCY CHANGE - Continued

5. Press the up arrow key. DVR display should read :01 (the colon with the number indicates that the number is a parameter number).
6. Press and hold up arrow key until display shows parameter number :90. Parameter number “90 is a password that can be used to protect the settings.
7. Press Function key on DVR once to display data for parameter :90.
8. Press and hold up arrow key or down arrow key to set the data for parameter number :90 to 0200.
9. Press Function key on DVR once to display parameter :90.
10. Press and hold up arrow key or down arrow key to change to parameter number :01.
11. Press Function key on DVR once to data for parameter.
12. Press and hold up arrow key or down arrow key to set the data for parameter per Table 1.
13. Press Function key on DVR once to switch back to the parameter number.
14. Press up arrow key once to change to next parameter number per Table 1.
15. Keep repeating from step 9, entering parameter data from Table 1, until all 6 parameter data is entered or verified to be correct.
16. Press Function key on DVR once to display data for parameter :90.
17. Press and hold up arrow key or down arrow key to set the data for parameter number :90 to any number but 0009 to lock the DVR. DVR will not stay locked when Engine Control switch is switched from either COOL DOWN/STOP to OFF/RESET and back to COOL DOWN/STOP or from COOL DOWN/STOP to MANUAL START.
18. Press Function key on DVR once to switch back to parameter number. Press and hold up arrow key or down arrow to set the parameter number back to 01.
19. Proceed to **REPROGRAMMING GSC SETPOINTS FOR VOLTAGE AND FREQUENCY CHANGE** and reprogram the OP5 parameters for P028 thru P031 (steps 1 thru 25).
20. If the generator set is not to be used, set ENGINE CONTROL Switch(ECS) to OFF/RESET, set DEAD CRANK SWITCH to OFF, and set Battery Disconnect Switch to OFF.

END OF TASK

REPROGRAMMING OR VERIFYING DVR PARAMETERS

The following procedure is used to reprogram the DVR if a DVR is replaced or if there is some reason to verify DVR parameters. Table 2 describes the parameters and lists values to be programmed or verified.

1. Set Battery Disconnect Switch to ON.
2. Set DEAD CRANK SWITCH to NORMAL.
3. On EMCP, set ENGINE CONTROL switch to COOL DOWN/STOP.
4. Select reprogramming data or parameter to be verified from Table 2.
5. DVR display should read :01 (the colon with the number indicates that the number is a parameter number).
6. Press and hold up arrow key until display shows parameter number :90.
7. Press Function key on DVR once to display data for parameter :90

REPROGRAMMING OR VERIFYING DVR PARAMETERS - Continued

Table 2. 200 kW TQG DVR Programming Parameters.

				TQG SETPOINTS 240/216		TQG SETPOINTS 120/206	
DESCRIPTION	**PARAMETER**	**ACTION**	**UNITS**	**60 Hz**	**50 Hz**	**60 Hz**	**50 Hz**
Generator output Voltage	:01	Program	Volts	434	410	217	205
Ratio of output volts to sensing volts	:02	Program	–	2.0	2.0	1.0	1.0
Generator type	:03	Program	–	0	0	0	0
Rated Generator Output Current	:04	Program	Ampere	347	289	694	578
CT Voltage at Rated Output Current	:05	Program	Volts	4.34	3.61	4.34	3.61
Knee Frequency	:06	Program	Hz	58.8	49.8	58.8	49.8
Decreasing Volts/Hz Slope 1	:07	Program	Volts/Hz	3.0	3.0	3.0	3.0
Decreasing Volts/Hz Slope 2	:08	Program	Volts/Hz	2.0	2.0	2.0	2.0
Minimum Voltage	:09	Program	%	50.0	50.0	50.0	50.0
Under Frequency Point	:10	Program	Hz	25.0	25.0	25.0	25.0
Overvoltage Trip Point	:11	Program	%	125.0	125.0	125.0	125.0
Overvoltage Trip Time	:12	Program	Seconds	2	2	2	2
Under Voltage Trip Point	:13	Program	%	75	75	75	75
Under Voltage Trip Time	:14	Program	Seconds	30	30	30	30
Voltage Gain (IR Compensation)	:15	Program	%	0	0	0	0

REPROGRAMMING OR VERIFYING DVR PARAMETERS - Continued

Table 2. 200 kW TQG DVR Programming Parameters - Continued.

				TQG SETPOINTS 240/216		TQG SETPOINTS 120/206	
DESCRIPTION	**PARAMETER**	**ACTION**	**UNITS**	**60 Hz**	**50 Hz**	**60 Hz**	**50 Hz**
Integral Gain	:16	Program	–	3.0	3.0	3.0	3.0
Proportional Gain	:17	Program	–	1.0	1.0	1.0	1.0
Single Phase Sensing 3ph=0 1ph=1	:18	Program	–	0000	0000	0000	0000
Diode Monitor Trip Point	:19	Program	Ampere	2.0	2.0	2.0	2.0
Reverse VAR Trip Time	:20	Program	Seconds	.5	.5	.5	.5
Reverse VAR Fault Selection	:21	Program	–	2	2	2	2
Droop/CCC Select 0+D 1=CCC	:22	Program	–	0	0	0	0
Droop Percentage	:30	Program	%	1.8	1.8	1.8	1.8
Reverse Power Trip Point	:34	Program	%	20	20	20	20
Reverse Power Trip Time	:35	Program	Seconds	7	7	7	7
Frequency	:50	View	Hz	–	–	–	–
Voltage	:51	View	Volts	–	–	–	–
Current	:52	View	Ampere	–	–	–	–
Reactive Output Current	:53	View	Ampere	–	–	–	–
Generator Real Current	:54	View	Ampere	–	–	–	–

REPROGRAMMING OR VERIFYING DVR PARAMETERS - Continued

Table 2. 200 kW TQG DVR Programming Parameters - Continued.

				TQG SETPOINTS 240/216		TQG SETPOINTS 120/206	
DESCRIPTION	**PARAMETER**	**ACTION**	**UNITS**	**60 Hz**	**50 Hz**	**60 Hz**	**50 Hz**
Exciter Field Current	:55	View	Ampere	–	–	–	–
3-phase kW	:56	View	kW	–	–	–	–
Power factor	:57	View	–	–	–	–	–
3-phase kVAR	:58	View	–	–	–	–	–
Hours	:60	View	Hours	–	–	–	–
Password	:90	Program	–	0009	0009	0009	0009
Software ID	:91	View	–	1.05	1.05	1.05	1.05
Latest Fault	:92	View	–	–	–	–	–
Previous Fault	:93	View	–	–	–	–	–
Fault Clear	:94	Switch	–	–	–	–	–
Shutdown Fault Reset	:96	Switch	–	–	–	–	–

8. Press and hold up arrow key ▲ or down arrow key ▼ to set the data for parameter number :90 to 0009. DVR will not stay locked when ENGINE CONTROL switch is switched from either COOL DOWN/STOP to OFF/RESET and back to COOLDOWN/STOP or from COOL DOWN/STOP to MANUAL START.
9. Press Function ◀▶ key on DVR once to display parameter: 90.
10. Press and hold up arrow key ▲ or down arrow key ▼ to change to parameter number :01.
11. Press Function ◀▶ key on DVR once to display data for parameter.
12. Press and hold up arrow key ▲ or down arrow key ▼ to set the data for parameter per Table 2.

REPROGRAMMING OR VERIFYING DVR PARAMETERS - Continued

13. Press Function key on DVR once to switch back to the parameter number.
14. Press up arrow key once to change to next parameter number per Table 2.
15. Keep repeating from step 7, entering or viewing parameter data from Table 2, until all parameter data is entered or verified to be correct.
16. Press Function key on DVR once to display data for parameter :90.
17. Press and hold up arrow key or down arrow key to set the data for parameter number :90 to any number but 0009 to lock the DVR. DVR will not stay locked when ENGINE CONTROL switch is switched from either COOL DOWN/STOP to OFF/RESET and back to COOL DOWN/STOP or from COOL DOWN/STOP to MANUAL START.
18. If the generator set is not to be used, set ENGINE CONTROL switch to OFF/RESET, set DEAD CRANK SWITCH to OFF, and set Battery Disconnect Switch to OFF.

END OF TASK

REPROGRAMMING GSC SETPOINTS FOR VOLTAGE AND FREQUENCY CHANGE

1. Set Battery Disconnect Switch to ON.
2. Set DEAD CRANK SWITCH to NORMAL.
3. On EMCP, set ENGINE CONTROL Switch (ECS) to COOL DOWN/STOP.
4. Select programming data for GSC from Table 3 for desired output voltage and desired frequency.

Table 3. 200 kW TQG GSC Programming Setpoints.

DESIRED OUTPUT		OP5-0				OP5-1			
VOLTS	HERTZ	P028	P029	P030	P031	P114	P117	P120	P123
120/208	60	208	694	200	60	63	66	57	54
120/208	50	208	576	166	50	53	55	48	45
240/416	60	416	347	200	60	63	66	57	54
240/416	50	416	288	166	50	53	55	48	45

REPROGRAMMING GSC SETPOINTS FOR VOLTAGE AND FREQUENCY CHANGE - Continued

NOTE

In SERVICE MODE, the buttons on the GSC keypad perform new functions as follows:

POWER METER is Scroll Right
AC METER is Scroll Up
ENGINE METER is Scroll Down
LAMP TEST is Select
ALARM CODES is Enter

5. Press SERVICE MODE key on GSC. SERV will be displayed on upper display. OP1 will be displayed on lower display.
6. Press AC METER key five times. OP3 will be displayed.
7. Press the LAMP TEST key. P E ---------- will be displayed. The left-most underline will be flashing. If an error is made any time during the password entry, P E FAIL will be displayed. Password entry can be restarted by pressing LAMP TEST key.
8. Press POWER METER key. P E 1 _ _ _ _ will be displayed. The left-most underline will be flashing.
9. Press ENGINE METER key. P E 1 3 _ _ _ will be displayed. The left-most underline will be flashing.
10. Press AC METER key. P E 1 3 2 _ _ will be displayed. The left-most underline will be flashing.
11. Press AC ENGINE key. P E 1 3 2 3 _ will be displayed. The underline will be flashing.
12. Press POWER METER key. P E 1 3 2 3 1 will be displayed.
13. Press ALARM CODES key. P E PASS will be displayed.
14. Press EXIT key. OP4 will be displayed.
15. Press AC METER key. OP5 will be displayed.

NOTE

For input values the OP set and the parameter values will toggle between the upper and lower displays as each OP set is entered.

16. Press AC METER key or ENGINE METER key until OP5-0 is displayed.
17. Press LAMP TEST key. P001 will be displayed followed by the value of the setpoint.
18. Press ENGINE METER key until P028 is displayed (P028 is first setpoint in table).
19. Press LAMP TEST key. The value of the setpoint will begin to flash.
20. Press AC METER key or ENGINE METER key to change the value, as required, to what is shown in Table 3 corresponding to the desired voltage and frequency.
21. Press ALARM CODES key. The value of the setpoint will stop flashing.

REPROGRAMMING GSC SETPOINTS FOR VOLTAGE AND FREQUENCY CHANGE - Continued

22. Repeat steps 18 through 21 until all setpoint values are checked or changed for OP5-0.

23. Repeat steps 16 through 22 for OP5-1. The first setpoint displayed will be P101. The first setpoint to be changed/verified is P114, per Table 3.

24. At the completion of the programming, press EXIT key until SERV is no longer displayed on upper display.

25. If the generator set is not to be used, set ENGINE CONTROL Switch (ECS) to OFF/RESET, set DEAD CRANK SWITCH to OFF, and set Battery Disconnect Switch to OFF.

END OF TASK

REPROGRAMMING OR VERIFYING GSC SETPOINTS

The following procedure is used to reprogram the GSC if a GSC is replaced or if there is some reason to verify GSC setpoints as part of troubleshooting or analysis. Table 4 describes 200 kW OP5-0 Engine/Generator Setpoint Programming and lists values to be programmed or verified. Table 5 describes OP5-1 Protective Relaying Setpoint Programming and lists values to be programmed or verified. Table 6 describes OP5-3 Synchronization Setpoint Programming and lists values to be programmed or verified. Table 7 describes OP6-0 Spare Input/Output Setpoint Programming. Table 8 describes OP8 data from ATB and BTB transformers in the control panel that must be entered if either of those devices is replaced.

1. Set Battery Disconnect Switch to ON.

2. Set DEAD CRANK SWITCH to NORMAL.

3. On EMCP, set ENGINE CONTROL switch to COOL DOWN/STOP.

4. Select programming data for GSC from Tables 4 thru 8 for GSC programming to be verified or completed. If GSC has been replaced, all setpoints must be verified or reprogrammed. Factory default values must be verified and TQG custom values must be programmed.

NOTE

In SERVICE MODE, the buttons on the GSC keypad perform new functions as follows:

POWER METER is Scroll Right
AC METER is Scroll Up
ENGINE METER is Scroll Down
LAMP TEST is Select
ALARM CODES is Enter

5. Press SERVICE MODE key on GSC. SERV will be displayed on upper display. OP1 will be displayed on lower display.

6. Press AC METER key five times. OP3 will be displayed.

7. Press the LAMP TEST key. P E ---------- will be displayed. The left-most underline will be flashing. If an error is made any time during the password entry, P E FAIL will be displayed. Password entry can be restarted by pressing LAMP TEST key.

8. Press POWER METER key. P E 1 _ _ _ _ will be displayed. The left-most underline will be flashing.

REPROGRAMMING OR VERIFYING GSC SETPOINTS - Continued

9. Press ENGINE METER key. P E 1 3 _ _ _ will be displayed. The left-most underline will be flashing.
10. Press AC METER key. P E 1 3 2 _ _ will be displayed. The left-most underline will be flashing.
11. Press ENGINE METER key. P E 1 3 2 3 _ will be displayed. The underline will be flashing.
12. Press POWER METER key. P E 1 3 2 3 1 will be displayed.
13. Press ALARM CODES key. P E PASS will be displayed.
14. Press EXIT key. OP4 will be displayed.
15. Press AC METER key. OP5 will be displayed.

NOTE

For input values the OP set and the parameter values will toggle between the upper and lower displays as each OP set is entered.

16. Press AC METER key or ENGINE METER key until OP5-0 is displayed.
17. Press LAMP TEST key. P001 will be displayed followed by the value of the setpoint.
18. Press ENGINE METER key until next setpoint to be verified or changed is displayed.
19. Press LAMP TEST key. The value of the setpoint will begin to flash.
20. Press AC METER key or ENGINE METER key to change the value, as required, to what is shown in Table 4 corresponding to the desired setpoint value.
21. Press ALARM CODES key. The value of the setpoint will stop flashing.
22. Repeat steps 18 through 21 until all setpoint values are checked or changed for OP5-0.
23. Repeat the process in steps 16 through 22 for OP5-1. The first setpoint displayed for OP5-1 will be P101. The first setpoint to be changed/verified is P101 per Table 5.
24. Repeat the process in steps 16 through 22 for OP5-3. The first setpoint displayed for OP5-3 will be P301. The first setpoint to be changed/verified is P301, per Table 6.
25. Repeat the process in steps 16 through 22 for OP6-0. The first setpoint displayed for OP6-0 will be SP01. The first setpoint to be changed/verified is SP01 per Table 7.
26. At the completion of the programming, press EXIT key until SERV is no longer displayed on upper display.
27. If the generator set is not to be used, set ENGINE CONTROL switch to OFF/RESET, set DEAD CRANK SWITCH to OFF, and set Battery Disconnect Switch to OFF.

REPROGRAMMING OR VERIFYING GSC SETPOINTS - Continued

Table 4. 200 kW OP5-0 Engine/Generator Setpoint Programming.

DESCRIPTION	RANGE OF VALUES	FACTORY DEFAULT	240/416 60 Hz (50 Hz) [8]	120/208 60Hz (50 Hz)
P001 – Fuel Solenoid Type: Type of fuel system solenoid used on the TQG.	0 – ETR fuel solenoid 1 – ETS fuel solenoid	0	0	0
P002 – Units Shown: Type of measurement units shown on the GSC display.	0 – for English units (psi, °F) 1 – for metric units (kPa, °C)	0	0	0
P003 – Shutdown Override for Engine Fault: GSC response to a low engine oil pressure or high coolant temperature fault.	0 – for engine shutdown 1 – for alarm only (shutdown override, no engine shutdown)	0	0	0
P004 – Shutdown Override For Sensor Fault: GSC response to a diagnostic fault with the engine oil pressure sensor, coolant temperature sensor, oil temperature sensor, sensor power supply, or coolant loss sensor.	0 – for alarm only (shutdown override, no engine shutdown) 1 – for engine shutdown	0	0	0
P005 – Coolant Loss Sensor Installed: Tells whether or not the optional engine coolant loss sensor is installed on the TQG.	0 – for TQGs without a coolant loss sensor 1 – for TQGs with coolant loss sensor	0	1	1
P006 – Shutdown Override for Coolant Loss Fault: GSC response to an engine coolant loss fault.	0 – for engine shutdown 1 – for alarm only (shutdown override, no engine shutdown)	0	1	1
P007 – System Voltage, 24 or 32 Volts: System voltage (battery voltage) of the TQG.	24 or 32	24	24	24
P008 – This setpoint is not currently being used by GSC and cannot be programmed.	N/A	N/A	N/A	N/A

[8] Setpoints to be changed from factory defaults to 200 TQG setpoints at switch gear supplier.

REPROGRAMMING OR VERIFYING GSC SETPOINTS - Continued

Table 4. 200 kW OP5-0 Engine/Generator Setpoint Programming - Continued.

DESCRIPTION	RANGE OF VALUES	FACTORY DEFAULT	240/416 60 Hz (50 Hz) [8]	120/208 60Hz (50 Hz)
P009 – Number of Ring Gear Teeth: Number of teeth on the ring gear of the engine. Used by GSC to determine engine speed.	95 to 350 teeth in increments of one tooth.	136	113	113
P010 – Engine Overspeed: Engine speed used by GSC to declare that an engine overspeed fault exists. The engine overspeed setpoint (for all 60 Hz applications) is 1.18 times rated speed.	500 to 4330 rpm in increments of 10 rpm.	2120 rpm	2120 rpm	2120 rpm
P011 – Crank Terminate Speed: Engine speed used by GSC to disengage starting motor during engine cranking.	100 to 1000 rpm in increments of 10 rpm.	400 rpm	400 rpm	400 rpm
P012 – Oil Step Speed: Engine speed used by GSC for distinguishing between rated speed and idle speed when a low oil pressure fault exists.	400 to 1800 rpm in increments of 10 rpm	1350 rpm	1350 rpm	1350 rpm
P013 – Low Oil Pressure Shutdown at Rated Speed: Oil pressure used by GSC to declare that a low oil pressure shutdown fault exists with engine at rated speed (the engine speed must have exceeded the oil step speed for nine seconds). [2]	34 to 420 kPa (5 to 61 psi) in increments of 1	205 kPa (30 psi)	30 psi	30 psi

[2] When oil pressure drops to within 34 kPa (5 psi) of the P013 or P014 setpoint, GSC issues a low oil pressure alarm.

[8] Setpoints to be changed from factory defaults to 200 TQG setpoints at switch gear supplier.

REPROGRAMMING OR VERIFYING GSC SETPOINTS - Continued

Table 4. 200 kW OP5-0 Engine/Generator Setpoint Programming - Continued.

DESCRIPTION	RANGE OF VALUES	FACTORY DEFAULT	240/416 60 Hz (50 Hz) [8]	120/208 60Hz (50 Hz)
P014 – Low Oil Pressure Shutdown at Idle Speed: Oil pressure used by GSC to declare that a low oil pressure shutdown fault exists with the engine at idle speed (the engine must have been running for at least 9 seconds and the engine speed must be less than oil step speed). [2]	20 to 336 kPa (3 to 49 psi) in increments of 1	70 kPa (10 psi)	10 psi	10 psi
P015 – High Water Temperature Shutdown: Coolant temperature used by GSC to declare a high coolant temperature shutdown fault exists (after a 10 second delay). [3]	85 to 123°C (185 to 253°F) in increments of 1	107°C (225°F)	230°F	230°F
P016 – Low Water Temperature Alarm: Coolant temperature used by GSC to declare that a low coolant temperature alarm fault exists (after a 2 second delay).	0 to 36°C (32 to 97°F) in increments of 1	21°C (70°F)	70°F	70°F
P017 – Total Cycle Crank Time: Cycle crank time used by GSC to declare that an overcrank fault exists.	5 to 120 seconds in increments of 1 second	90 sec	90 sec	90 sec
P018 – Cycle Crank Time: Amount of time GSC cranks and then rests the starting motor during a single crank cycle.	5 to 60 seconds in increments of 1 second	10 sec	30 sec	30 sec

[2] When oil pressure drops to within 34 kPa (5 psi) of the P013 or P014 setpoint, GSC issues a low oil pressure alarm.

[3] When coolant temperature rises to within 6°C (11°F) of the P015 setpoint, GSC issues high coolant temperature alarm.

[8] Setpoints to be changed from factory defaults to 200 TQG setpoints at switch gear supplier.

REPROGRAMMING OR VERIFYING GSC SETPOINTS - Continued

Table 4. 200 kW OP5-0 Engine/Generator Setpoint Programming - Continued.

DESCRIPTION	RANGE OF VALUES	FACTORY DEFAULT	240/416 60 Hz (50 Hz) [8]	120/208 60Hz (50 Hz)
P019 – Cooldown Time: Amount of time GSC allows the engine to run after a normal shutdown is initiated.	0 to 30 minutes in increments of 1 minute.	5 min	5 min	5 min
P020 – AC Voltage: Nominal AC voltage of generator. The GSC measures and displays the AC voltage. [4]	700, 150, 300, 500, 600, 750, 3.0k, 4.5k, 5.20k, 5.25k, 9.0k, 15.0k, 18.0k, 30.0k	700	700	700
P021 – AC Current Full Scale: Nominal full scale AC current of generator. AC current full scale is equal to ratio of external current transformers in generator housing.	75, 100, 150, 200, 300, 400, 600, 800, 1000, 1200, 1500, 2000, 2500, 3000, and 4000A	600	800	800
P022 – GSC Engine Number: Informs other devices on the CAT Data Link of the engine number for GSC. [5]	01 through 08	01	01	01
P023 – Engine Type: Identifies the engine as a mechanical unit injector (MUI) diesel, spark ignited (gas), or electronic unit injector (EUI) diesel engine.	0 – MUI diesel 1 – Gas 2 – EIU diesel	0	2	2

[4] The values other than the default (700V) are for switch gear applications and require the use of external potential transformers and the removal of the AC voltage range jumper located in the relay module. See the topic AC Voltage Range Selection in the Testing and Adjusting section.

[5] After setpoint P022 is reprogrammed, GSC must be power cycled (powered down and then powered up).

[8] Setpoint to be changed from factory defaults to 200 TQG setpoints at switch gear supplier.

REPROGRAMMING OR VERIFYING GSC SETPOINTS - Continued

Table 4. 200 kW OP5-0 Engine/Generator Setpoint Programming - Continued.

DESCRIPTION	RANGE OF VALUES	FACTORY DEFAULT	240/416 60 Hz (50 Hz) [8]	120/208 60Hz (50 Hz)
P024 – Crank Time Delay: Amount of time GSC delays activation of the fuel control relay (FCR) during a crank cycle. This setpoint is for gas engines only. The P024 setpoint only functions when the P023 setpoint is set to 1 (gas engine). [7]	0 to 20 seconds in increments of 1 second	5 sec	5 sec	5 sec
P025 – Oil Temperature Sensor Installed: Tells whether or not the optional engine oil temperature sensor is installed on the TQG.	0 – for TQGs without an oil temperature sensor 1 – for TQGs with an oil temperature sensor	0	0	0
P026 – High Oil Temperature Shutdown: Oil temperature used by GSC to declare a high oil temperature shutdown fault exists (after a 10 second delay). Refer to the panel model number.	85 to 123°C (185 to 253°F) in increments of 1	107°C (225°F)	253°F	253°F
P027 – Shutdown Override for High Oil Temperature Fault: GSC+ response to an engine high oil temperature fault.	0 – for alarm only (shutdown override, no engine shutdown) 1 – for engine shutdown	0	0	0
P028 – Nameplate Voltage: Rated voltage of generator. This setpoint is used for protective relaying functions.	100 to 25kV in increments of 1	480V	416V (416V)	208V (208V)
P029 – Nameplate Current: Rated current output of generator.	0 to 4000 A in increments of 1	600A	347A (288A)	694A (576A)

[7] The P024 setpoint only functions when the P023 setpoints is set to 1 (gas engine).
[8] Setpoints to be changed from factory defaults to 200 TQG setpoint at switch gear supplier.

REPROGRAMMING OR VERIFYING GSC SETPOINTS - Continued

Table 4. 200 kW OP5-0 Engine/Generator Setpoint Programming - Continued.

DESCRIPTION	RANGE OF VALUES	FACTORY DEFAULT	240/416 60 Hz (50 Hz) [8]	120/208 60Hz (50 Hz)
P030 – Nameplate Power: Rated power capability of generator.	0 through 10 MW in increments of 1 kW	400 kW	200 kW (166 kW)	200 kW (166 kW)
P031 – Rated Frequency: Nominal frequency rating of TQG.	50 or 60 Hz	60 Hz	60 Hz (50 Hz)	60 Hz (50 Hz)
P032 – Connection Configuration of Generator: Wye or Delta configuration of generator.	0 – Wye 1 – Delta	0	0	0
P033 – Number of Generator Poles. [6]	0 through 254 in increments of 2	4	4	4

[1] The setpoints (stored or being programmed) must match the specified setpoints of the TQG.
[6] When P033 is programmed to 0 poles, the AL15 (GSC Configuration Error) fault is disabled.
[8] Setpoints to be changed from factory defaults to 200 TQG setpoints at switch gear supplier.

Table 5. OP5-1 Protective Relaying Setpoint Programming.

DESCRIPTION	RANGE OF VALUES	FACTORY DEFAULT	SETPOINTS 60 Hz (50 Hz) [3]
P101 Generator Overvoltage Alarm Enable: GSC enables or disables generator overvoltage alarm function.	0 – disabled 1 – enabled	1	1
P102 – Generator Overvoltage Alarm Threshold: Voltage GSC uses to issue overvoltage alarm.	100 to 125% of nameplate voltage in increments of 1%	105%	125%
P103 – Generator Overvoltage Alarm Time Delay: Amount of time the FSC+ waits before issuing overvoltage alarm.	0 through 120 seconds [2] in increments of 1	10 sec	0 sec

[2] When programmed to 0 seconds, the actual time is from 0.5 to 1.0 seconds.
[3] Setpoints to be changed from factory defaults to 200 TQG setpoints at switch gear supplier.
[4] Setpoint values for disabled parameters are for fail safe/pack purposes.

REPROGRAMMING OR VERIFYING GSC SETPOINTS - Continued

Table 5. OP5-1 Protective Relaying Setpoint Programming - Continued.

DESCRIPTION	RANGE OF VALUES	FACTORY DEFAULT	SETPOINTS 60 Hz (50 Hz) [3]
P104 – Generator Overvoltage Shutdown Enable: GSC enables or disables the generator overvoltage shutdown function.	0 – disabled 1 – enabled	1	1
P105 – Generator Overvoltage Shutdown Threshold: Voltage GSC used to issue an overvoltage shutdown.	100 to 125% of nameplate voltage in increments of 1%	110%	125%
P106 – Generator Overvoltage Shutdown Time Delay: Amount of time GSC waits before issuing an overvoltage shutdown.	0 through 120 seconds [2] in increments of 1	10 sec	1 sec
P107 – Generator Undervoltage Alarm Enable: GSC enables or disables the generator undervoltage alarm function.	0 – disabled 1 – enabled	1	1
P108 – Generator Undervoltage Alarm Threshold: Voltage GSC uses to issue an undervoltage alarm.	60 to 100% of nameplate voltage in increments of 1%	90%	82%
P109 – Generator Undervoltage Alarm Time Delay: Amount of time GSC waits before issuing an undervoltage alarm.	0 through 120 seconds [2] in increments of 1	10 sec	6 sec
P110 – Generator Undervoltage Shutdown Enable: GSC enables or disables the generator undervoltage shutdown function.	0 – disabled 1 – enabled	1	0
P111 – Generator Undervoltage Shutdown Threshold: Voltage GSC uses to issue an undervoltage shutdown.	60 to 100% of nameplate voltage in increments of 1%	85%	75%
P112 – Generator Undervoltage Shutdown Time Delay: Amount of time GSC waits before issuing an undervoltage shutdown.	0 through 120 seconds [2] in increments of 1	15 sec	6 sec

[2] When programmed to 0 seconds, the actual time is from 0.5 to 1.0 seconds.
[3] Setpoints to be changed from factory defaults to 200 TQG setpoints at switch gear supplier.

REPROGRAMMING OR VERIFYING GSC SETPOINTS - Continued

Table 5. OP5-1 Protective Relaying Setpoint Programming - Continued.

DESCRIPTION	RANGE OF VALUES	FACTORY DEFAULT	SETPOINTS 60 Hz (50 Hz) [3]
P113 – Generator Overfrequency Alarm Enable: GSC enables or disables the generator overfrequency alarm function.	0 – disabled 1 – enabled	1	1
P114 – Generator Overfrequency Alarm Threshold: Frequency GSC uses to issue an overfrequency alarm.	50-60 Hz, for 50 Hz generator 60-70 Hz, for 60 Hz generator 400-480 Hz, for 400 Hz generator	53 Hz 63 Hz 422 Hz	63 Hz/53 Hz
P115 – Generator Overfrequency Alarm Time Delay: Amount of Time GSC waits before issuing an overfrequency alarm.	0 through 120 seconds [2] in increments of 1	10 sec	10 sec
P116 – Generator Overfrequency Shutdown Enable: GSC enables or disables the generator overfrequency shutdown function.	0 – disabled 1 – enabled	1	0
P117 – Generator Overfrequency Shutdown Threshold: Frequency GSC uses to issue an overfrequency shutdown.	50-60 Hz, for 50 Hz generator 60-70 Hz, for 60 Hz generator 400-480 Hz, for 400 Hz generator	55 Hz 66 Hz 440 Hz	66 Hz/55 Hz
P118 – Generator Overfrequency Shutdown Time Delay: Amount of time GSC waits before issuing an overfrequency shutdown.	0 through 120 seconds [2] in increments of 1	10 sec	10 sec
P119 – Generator Underfrequency Alarm Enable: GSC enables or disables the generator underfrequency alarm function.	0 – disabled 1 – enabled	1	1

[2] When programmed to 0 seconds, the actual time is from 0.5 to 1.0 seconds.
[3] Setpoints to be changed from factory defaults to 200 TQG setpoints at switch gear supplier.

REPROGRAMMING OR VERIFYING GSC SETPOINTS - Continued

Table 5. OP5-1 Protective Relaying Setpoint Programming - Continued.

DESCRIPTION	RANGE OF VALUES	FACTORY DEFAULT	SETPOINTS 60 Hz (50 Hz) [3]
P120 – Generator Underfrequency Alarm Threshold: Frequency GSC uses to issue an underfrequency alarm.	30-50 Hz, for 50 Hz generator 36-60 Hz, for 60 Hz generator 240-400 Hz, for 400 Hz generator	48 Hz 57 Hz 378 Hz	57 Hz/48 Hz
P121 – Generator Underfrequency Alarm Time Delay: Amount of time GSC waits before issuing an underfrequency alarm.	0 through 120 seconds [2] in increments of 1	10 sec	10 sec
P122 – Generator Underfrequency Shutdown Enable: GSC enables or disables the generator underfrequency shutdown function.	0 – disabled 1 – enabled	1	0
P123 – Generator Underfrequency Shutdown Threshold: Frequency GSC uses to issue an underfrequency shutdown.	30-50 Hz, for 50 Hz generator 36-60 Hz, for 60 Hz generator 240-400 Hz, for 400 Hz generator	45 Hz 54 Hz 360 Hz	54 Hz/45 Hz
P124 – Generator Underfrequency Shutdown Time Delay: Amount of time GSC waits before issuing an underfrequency shutdown.	0 through 120 seconds [2] in increments of 1	15 sec	15 sec
P125 – Generator Reverse Power Shutdown Enable: GSC enables or disables the generator reverse power shutdown function.	0 – disabled 1 – enabled	1	1
P126 – Generator Reverse Power Shutdown Threshold: Level of reverse power GSC uses to issue a reverse power shutdown.	0 through 20% of rated power in increments of 1%	15%	17%

[2] When programmed to 0 seconds, the actual time is from 0.5 to 1.0 seconds.
[3] Setpoints to be changed from factory defaults to 200 TQG setpoints at switch gear supplier.

REPROGRAMMING OR VERIFYING GSC SETPOINTS - Continued

Table 5. OP5-1 Protective Relaying Setpoint Programming - Continued.

DESCRIPTION	RANGE OF VALUES	FACTORY DEFAULT	SETPOINTS 60 Hz (50 Hz) [3]
P127 – Generator Reverse Power Shutdown Time Delay: Amount of time the FSC+ waits before issuing a reverse power shutdown.	0 through 30 seconds [2] in increments of 1	10 sec	3 sec
P128 – Generator Overcurrent Alarm Enable: GSC enables or disables the overcurrent alarm.	0 – disabled 1 – enabled	1	1
P129 – Generator Phase Overcurrent Alarm Threshold: Level of current GSC uses to issue a phase overcurrent alarm.	100 through 160% of nameplate current in increments of 5%	105%	160%
P130 – Generator Phase Overcurrent Alarm Time Delay: Amount of time GSC waits before issuing a phase overcurrent alarm.	0 through 250 seconds [2] in increments of 1	0 sec	0 sec
P131 – Generator Total Overcurrent Alarm Threshold: Level of current GSC uses to issue a total overcurrent alarm.	100 through 160% of nameplate current in increments of 5%	105%	160%
P132 – Generator Total Overcurrent Alarm Time Delay: Amount of time GSC waits before issuing a total overcurrent alarm.	0 through 250 seconds [2] in increments of 1	0 sec	0 sec
P133 – Generator Overcurrent Shutdown Enable: GSC enables or disables the overcurrent shutdown.	0 – disabled 1 – enabled	1	0
P134 – Generator Phase Overcurrent Shutdown Threshold: Level of current GSC uses to issue a phase overcurrent shutdown.	100 through 160% in increments of 5%	110%	160%
P135 – Generator Phase Overcurrent Shutdown Time Delay: Amount of time GSC waits before issuing a phase overcurrent shutdown.	0 through 500 seconds [2] in increments of 1	0 sec	0 sec

[2] When programmed to 0 seconds, the actual time is from 0.5 to 1.0 seconds.
[3] Setpoints to be changed from factory defaults to 200 TQG setpoints at switch gear supplier.

REPROGRAMMING OR VERIFYING GSC SETPOINTS - Continued

Table 5. OP5-1 Protective Relaying Setpoint Programming - Continued.

DESCRIPTION	RANGE OF VALUES	FACTORY DEFAULT	SETPOINTS 60 Hz (50 Hz) [3]
P136 – Generator Total Overcurrent Shutdown Threshold: Level of current GSC uses to issue a total overcurrent shutdown.	100 through 160% of three times nameplate current in increments of 5%	110%	160%
P137 – Generator Total Overcurrent Shutdown Time Delay: Amount of time GSC waits before issuing a total overcurrent shutdown.	0 through 500 seconds [2] in increments of 1	0 sec	0 sec
P138 – KW Level Relay Enable: GSC enables or disables the kW level relay function.	0 – disabled 1 – enabled	1	1
P139 – KW Level Relay Threshold: Level of power GSC uses to activate the kW level relay function.	0 through 110% of nameplate power in increments of 1%	105%	110%
P140 – KW Level Relay Time Delay: Amount of time GSC waits before activating the kW level relay function.	0 through 120 seconds [2] in increments of 1	0 sec	0 sec
P141 – KW Level Relay Disengage Threshold: Level of power GSC uses to deactivate the kW level relay function.	0 through 110% of nameplate power in increments of 1%	100%	100%
P142 – KW Level Relay Disengage Time Delay: Amount of time GSC waits before deactivating the kW level relay function.	0 through 120 seconds [2] in increments of 1	10 sec	10 sec

[1] Setpoints are programmed at the factory to default value. Some setpoints changed to satisfy application requirements.
[2] When programmed to 0 seconds, the actual time is from 0.5 to 1.0 seconds.
[3] Setpoints to be changed from factory defaults to 200 TQG setpoints at switch gear supplier.

REPROGRAMMING OR VERIFYING GSC SETPOINTS - Continued

Table 6. OP5-3 Synchronization Setpoint Programming.

DESCRIPTION	RANGE OF VALUES	FACTORY DEFAULT	SETPOINTS
P301 – Synchronization Enable: Enables or disables synchronization function and specifies Load Share control being driven.	0 – disabled 1 – Woodward	0	1
P302 – Breaker Coil Time Limit: Maximum amount of time breaker coil can be energized without damaging coil.	0.2 to 5.0 seconds in increments of 0.1 seconds	1.0 sec	1
P303 – Voltage Limit Enable: Enables or disables generator-bus voltage checking during automatic synchronization.	0 – disabled 1 – enabled	1	1
P304 – Voltage Limit: Maximum acceptable difference between bus voltage and oncoming voltage, expressed as a percentage of bus voltage.	1% to 15% in increments of 1%	1%	4%
P305 – Phase Tolerance Limit: Maximum phase angle magnitude allowed for breaker closure. [2]	1 to 25 degrees in increments of 1 degree	5 deg	5 deg
P306 – Dwell Time: Time during which the phase angle between generator and bus must be within Phase Tolerance Limit for breaker closure. [2]	0.1 to 1.0 seconds in increments of 0.1 second	0.5 sec	0.5 sec
P307 – Speed Control Gain: Controls how fast engine speed will change during synchronization. [2 3]	0.0% to 100.0% in increments of 0.1%	50.0%	% varies typical 12%

[2] P305, P306, P307, P308, and P309 can be adjusted to precisely match individual engine response and breaker closure characteristics using OP11-Synchronization Setpoint Turning.

[3] GSC used P-1-D (proportional-integral-derivation) control to accomplish synchronization quickly and smoothly. The P, 1, and D parameters are independently controlled by setpoints P307, P308, and P309, respectively. Adjusting any one of these setpoints will not affect the other two settings.

REPROGRAMMING OR VERIFYING GSC SETPOINTS - Continued

Table 6. OP5-3 Synchronization Setpoint Programming - Continued.

DESCRIPTION	RANGE OF VALUES	FACTORY DEFAULT	SETPOINTS
P308 – Speed Control Rate: Controls rate of change of the phase angle difference between the generator and bus during synchronization. [2 3]	0.0% to 100.0% in increments of 0.1%	50.0%	% varies typical 17%
P309 – Speed Control Damping: Controls rate of change of the phase angle difference between the generator and bus during synchronization. [2 3]	0.0% to 100.0% in increments of 0.1%	0.0%	% varies typical 8%
P310 – Dead Bus Closure Enabled: Enables or disables automatic closure to a dead bus.	0 – disabled 1 – enabled	0	1
P311 – Dead Bus Limit: Maximum acceptable voltage for bus to be considered dead as a percentage of rated voltage.	5% to 50% in increments of 1%	20%	20%
P312 – Dead Bus On Time Delay: Amount of time GSC waits before closing to a dead bus.	0 to 120 seconds in increments of 1 second	0 sec	2 sec
P313 – Frequency Match Notification Time: Amount of time before notification of possible synchronization failure. Must not be greater than the Maximum Synchronization Time.	5 to 1000 seconds in increments of 1 second	20 sec	20 sec
P314 – Maximum Synchronization Time: Maximum amount of time to spend attempting to synchronize before setting Synchronization Timeout Alarm.	5 to 1000 seconds in increments of 1 second	20 sec	30 sec

[1] Setpoints are programmed at the factory to the default value. Setpoints changed to satisfy application requirements.

[2] P305, P306, P307, P308, and P309 ca be adjusted to precisely match individual engine response and breaker closure characteristics using OP11-Synchronization Setpoint Turning.

[3] GSC used P-1-D (proportional-integral-derivation) control to accomplish synchronization quickly and smoothly. The P, 1, and D parameters are independently controlled by setpoints P307, P308, and P309, respectively. Adjusting any one of these setpoints will not affect the other two settings.

[4] Setpoints to be changed from factory defaults to 200 TQG setpoints at switch gear supplier.

REPROGRAMMING OR VERIFYING GSC SETPOINTS - Continued

Table 7. OP6 Spare Input/Output Setpoint Programming.

DESCRIPTION	RANGE OF VALUES	FACTORY DEFAULT	SETPOINTS
SP01 – Spare Input 1 Active State: Input state used by GSC to declare that SP01 fault exists.	0 – Active low 1 – Active high	0	0
SP02 – Spare Input 1 Response: GSC response to SP01 fault.	0 – Shutdown 1 – Alarm	0	0
SP03 – Spare Input 1 Time Delay: Amount of time GSC waits before responding to a SP01 fault.	0 to 250 seconds in increments of 1	1 seconds	1 seconds
SP04 – Spare Input 2 Active State: Input stated used by GSC to declare that SP02 fault exists.	0 – Active low 1 – Active high	1	1
SP05 – Spare Input 2 Response: GSC response to SP02 fault.	0 – Shutdown 1 – Alarm	0	0
SP06 – Spare Input 2 Time Delay: Amount of time GSC waits before responding to SP02 fault.	0 to 250 seconds in increments of 1	0 seconds	0 seconds
SP07 – Spare Input 3 Active State: Input state used by GSC to declare that SP03 fault exists.	0 – Active low 1 – Active high	0	0
SP08 – Spare Input 3 Response: GSC response to SP03 fault.	0 – Shutdown 1 – Alarm	0	0
SP09 – Spare Input 3 Time Delay: Amount of time GSC waits before responding to SP03 fault.	0 to 250 seconds in increments of 1	0 seconds	0 seconds
SP10 – Spare Input 4 Active State: Input state used by GSC to declare that SP04 fault exists.	0 – Active low 1 – Active high	0	0
SP11 – Spare Input 4 Response: GSC response to SP04 fault.	0 – Shutdown 1 – Alarm	0	0

REPROGRAMMING OR VERIFYING GSC SETPOINTS - Continued

Table 7. OP6 Spare Input/Output Setpoint Programming - Continued.

DESCRIPTION	RANGE OF VALUES	FACTORY DEFAULT	SETPOINTS
SP12 – Spare Input 4 Time Delay: Amount of time GSC waits before responding to SP04 fault.	0 to 250 seconds in increments of 1	0 seconds	0 seconds
SP13 – Spare Output Response: GSC response to the spare output trigger condition.	0 – Active low 1 – Active high	0	0
SP15 – Spare Relay Output Response: GSC response to the spare relay trigger condition.	0 – Relay inactive when triggered 1 – Relay active when triggered	1	1
SP14 – Spare Output Trigger Condition: The condition used by GSC to trigger the spare output trigger response.	0 – Unused 1 – Active SP01 fault [2] 2 – Active SP02 fault [2] 3 – Active SP03 fault [2] 4 – Active SP04 fault [2] 5 – Any combination of active SP01, SP02, SP03, or SP04 faults [2] 6 – Any active shutdown fault (AL1 thru AL14, SP01 – SP04, or CID FMI) 7 – Any active alarm or shutdown fault (AL1 thru AL15, SP01 thru SP04, or CID FMI) 8 – Cooldown mode 9 – Coolant loss fault [2] 10 – High oil temperature fault [2] 11 – CCM control [2] 12 – Other protective relay	8	8
SP16 – Spare Relay Output Trigger Condition: The condition used by GSC to trigger the spare relay.		8	12

[2] Either alarm or shutdown faults are valid trigger conditions.

REPROGRAMMING OR VERIFYING GSC SETPOINTS - Continued

Table 7. OP6 Spare Input/Output Setpoint Programming - Continued.

DESCRIPTION	RANGE OF VALUES	FACTORY DEFAULT	SETPOINTS
SP17 – Spare Indicator 1 Trigger Condition: The condition used by GSC to trigger Spare Indicator 1.	0 – Unused 1 – Active SP01 fault [3] 2 – Active SP02 fault [3] 3 – Active SP03 fault [3]	0	0
SP18 – Spare Indicator 2 Trigger Condition: The condition used by GSC to trigger Spare Indicator 2.	4 – Active SP04 fault [3] 5 – Any combination of active SP01, SP02, SP03, or SP04 faults [3]	0	0
SP19 – Spare Indicator 3 Trigger Indicator: The condition used by GSC to trigger Spare Indicator 3.	6 – Coolant loss fault [3] 7 – High oil temperature fault [3] 8 – kW level relay active	0	0

[1] The setpoints are programmed at the factory to the default value. The setpoints may be changed to satisfy customer requirements or application requirements.

[3] SP14 is programmed to 11 (CCM control), the spare output is always active low. When SP16 is programmed to 11 (CCM control), the spare relay is always active when triggered.

REPROGRAMMING OR VERIFYING GSC SETPOINTS - Continued

Table 8. OP8 Voltmeter Ammeter Programming.

SETPOINT	NAME	DESCRIPTION	RANGE OF VALUES	FACTORY DEFAULT	SETPOINT
AC01	VA	Phase A voltage calibration used by GSC to compensate for voltage characteristics of ATB A5.	0 to 255 in increments of 1	0	Barcode on ATB A5
AC02	VB	Phase B voltage calibration used by GSC to compensate for voltage characteristics of ATB A5.	0 to 255 in increments of 1	0	Barcode on ATB A5
AC03	VC	Phase C voltage calibration used by GSC to compensate for voltage characteristics of ATB A5.	0 to 255 in increments of 1	0	Barcode on ATB A5
AC04	IA	Phase A current calibration used by GSC to compensate for current characteristics of ATB A5.	0 to 255 in increments of 1	0	Barcode on ATB A5
AC05	IB	Phase B current calibration used by GSC to compensate for current characteristics of ATB A5.	0 to 255 in increments of 1	0	Barcode on ATB A5
AC06	IC	Phase C current calibration used by GSC to compensate for current characteristics of ATB A5.	0 to 255 in increments of 1	0	Barcode on ATB A5
AC07	VA	Phase A voltage calibration used by GSC to compensate for voltage characteristics of BTB A6.	0 to 255 in increments of 1	0	Barcode on BTB A6

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

INSTALLATION OF GENERATOR SET ON TRAILER

INITIAL SETUP:

Tools and Special Tools

Lifting Device, 10,000 lb (4535 kg) capacity
Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Tool Kit, General Mechanic's (WP 0123, Item 1)

Personnel Required

Two

References

TM 9-2330-376-14&P
TM 9-6115-730-24P

WARNING

The 200 Kw TQG weighs approximately 9300 lb (4218 kg) and requires an assistant and a lifting device (forklift, overhead lifting device) with sufficient capacity. Failure to comply can cause serious injury or death to personnel.

Be extremely careful when working near the 200 kW TQG as it is being positioned on the trailer. Failure to comply can cause injury to personnel.

INSTALLATION

1. Park XM1051 E1 trailer (Figure 1, Item 1) on level hard surface. Lower support legs (see TM 9-2330-376-14&P). Level trailer and chock wheels.
2. Using lifting device with sufficient capacity, maneuver TQG (Figure 1, Item 2), with control panel end toward tongue of trailer, into position over mounting holes on bed of trailer (Figure 1, Item 1).
3. Slowly lower TQG (Figure 1, Item 2) onto trailer (Figure 1, Item 1) and align with eight mounting holes.
4. Remove lifting device.

NOTE

All TQG-mounting screws are installed with nuts on top of bed of trailer, except at location A, at right rear of trailer.

5. Install eight screws (Figure 1, Item 3), 16 washers (Figure 1, Item 4), and eight nuts (Figure 1, Item 5). Torque eight nuts (Figure 1, Item 5) to 125 lb-ft (170 Nm).

INSTALLATION - Continued

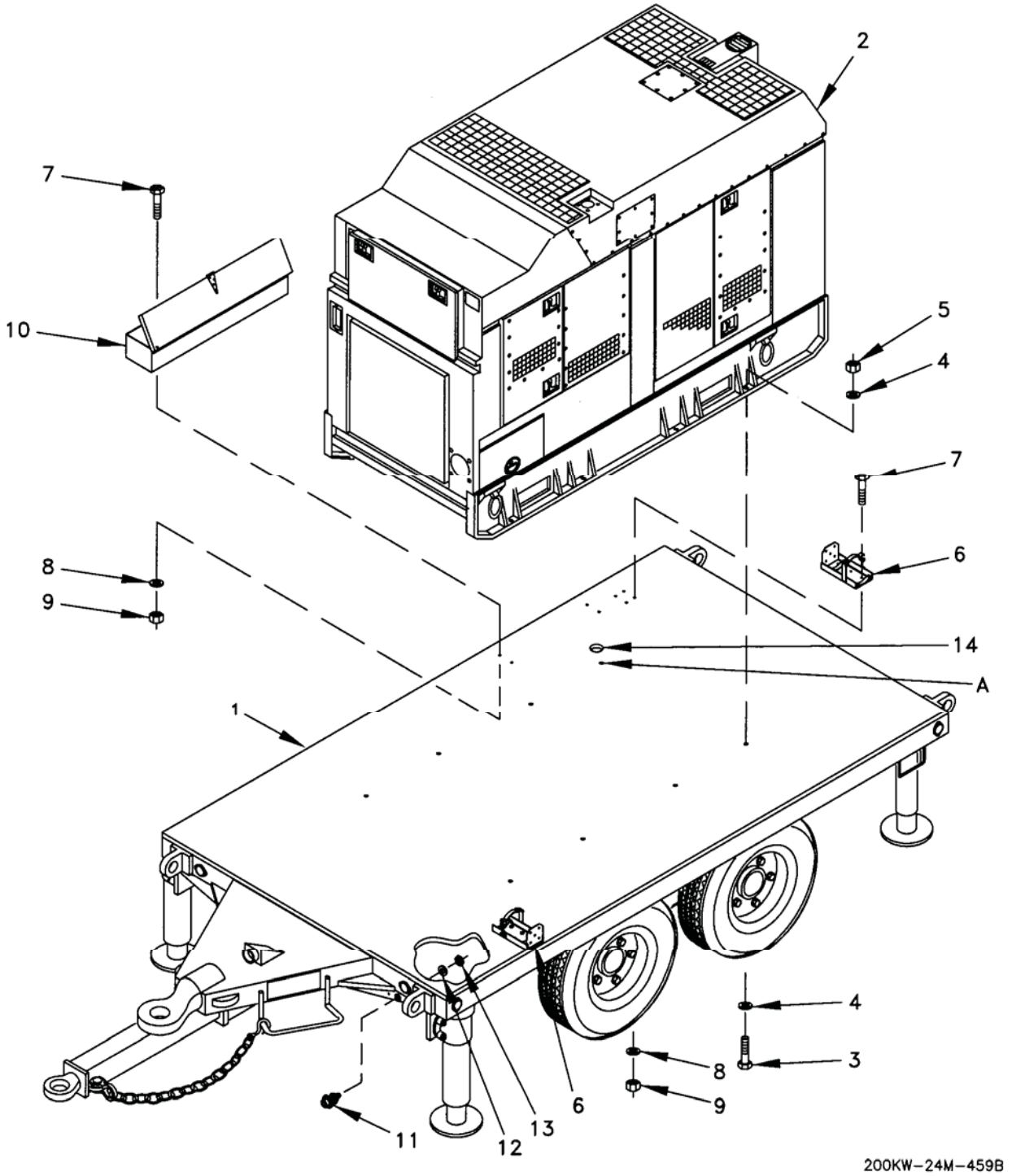

Figure 1. Installation of Generator Set on Trailer.

INSTALLATION - Continued

6. Install two fire extinguisher brackets (Figure 1, Item 6), eight screws (Figure 1, Item 7), washers (Figure 1, Item 8), and locknuts (Figure 1, Item 9).

7. Install accessory box (Figure 1, Item 10), four screws (Figure 1, Item 7), washers (Figure 1, Item 8), and locknuts (Figure 1, Item 9).

8. Install load terminal (Figure 1, Item 11), washer (Figure 1, Item 12), and locknut (Figure 1, Item 13).

9. Install grommet (Figure 1, Item 14) in deck.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
PREPARATION FOR STORAGE OR SHIPMENT

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Tool Kit, General Mechanic's (WP 0123, Item 1)
Pneumatic Oil Gun

Materials/Parts

Antifreeze (WP 0124, Item 5)
Fuel (WP 0124, Item 17)
Lubricating oil, preservation (WP 0124, Item 31)
Lubricating oil, preservation (WP 0124, Item 32)
Lubricating oil, general purpose (WP 0124, Item 33)
Petroleum jelly (WP 0124, Item 34)
Tape (WP 0124, Item 50)
Wiping rags (WP 0124, Item 35)
Wood block, 1 in. (2.54 cm) thick

Personnel Required

One

References

TM 9-6115-730-10
TM 740-90-1
TO 35-1-4
MIL-STD-129
TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the engine.

PREPARATION FOR STORAGE OR SHIPMENT

SHORT TERM STORAGE

NOTE

Short term is storage from 1 to 45 days.

1. Perform Quarterly PMCS (WP 0015). Correct all deficiencies found.
2. Check that Modification Work Order (MWO), Maintenance Instructions (MI) and Time Compliance Technical Orders (TCTO) have been applied.
3. Top off engine oil level with preservation oil (WP 0079).
4. Drain cooling system completely (WP 0068). Refill cooling system with a 50/50 mixture of antifreeze and water. Operate engine for a minimum of five minutes to circulate mixture.

END OF TASK

LONG TERM STORAGE

NOTE

Long term is storage longer than 45 days

1. Perform Quarterly PMCS (WP 0015). Correct all deficiencies found.
2. Check that Modification Work Order (MWO), Maintenance Instructions (MI) and Time Compliance Technical Orders (TCTO) have been applied.
3. Drain cooling system completely (WP 0068). Refill cooling system with 50/50 mixture of antifreeze and water (WP 0124, Item 5). Operate engine for a minimum of five minutes to circulate the antifreeze. Stop engine and allow to cool for 10 minutes.
4. Drain engine oil completely (WP 0079). Refill engine with preservation oil (WP 0124, Item 31).
5. Open left front doors.
6. Disconnect fuel pickup hose (Figure 1, Item 1) from fuel tank (Figure 1, Item 2). Disconnect fuel return hose (Figure 1, Item 3) from elbow (Figure 1, Item 4) on fuel tank (Figure 1, Item 2).
7. Position three containers, with at least a two gallon capacity each, beside the left doors.
8. Place end of fuel return hose (Figure 1, Item 3) into container A (waste container).
9. Fill container B with one gallon fuel (WP 0124, Item 17). Fill container C with one gallon general purpose oil (WP 0124, Item 32).
10. Place end of fuel pickup hose (Figure 1, Item 1) into container B (fuel).
11. Start engine and run for two minutes using the fuel in container B. After two minutes, place end of fuel pickup hose (Figure 1, Item 1) into container C (oil). Operate until oil from container C comes out of fuel return line into container A (waste container). Shut down engine and allow to cool at least 10 minutes.

LONG TERM STORAGE - Continued

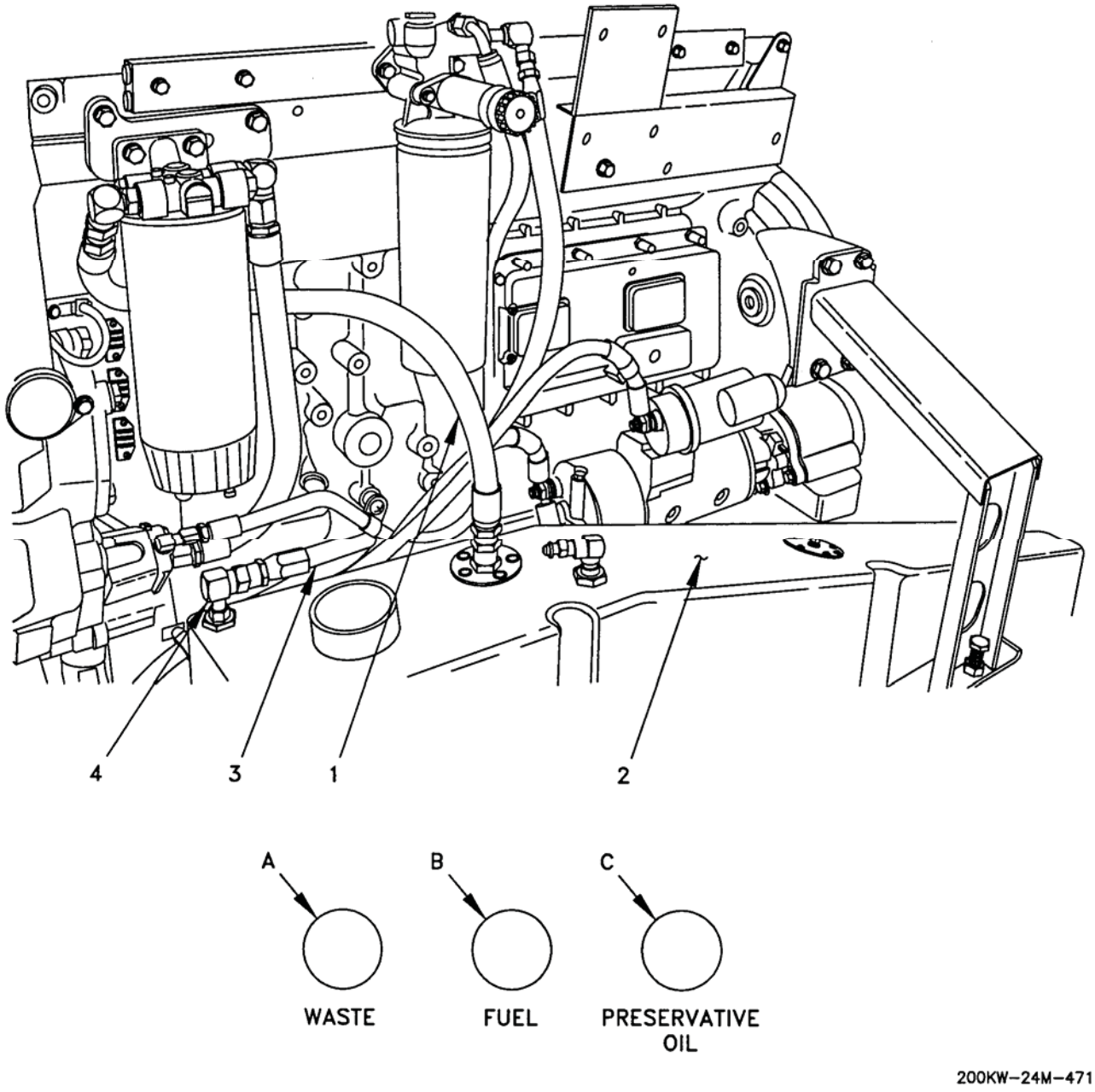

Figure 1. Preparation for Storage or Shipment.

12. Reconnect fuel pickup hose (Figure 1, Item 1) to fuel tank (Figure 1, Item 2). Connect fuel return hose (Figure 1, Item 3) to elbow (Figure 1, Item 4) on fuel tank (Figure 1, Item 2). Do not use waste fuel/oil mixture to preserve other engines or damage may occur.

13. Dispose of fuel/oil mixture in container A (waste) in accordance with local regulations.

LONG TERM STORAGE - Continued

14. Disconnect manifold in hose from intake manifold (WP 0067, Step 16). Set DEAD CRANK SWITCH to CRANK to turn over engine, use a pneumatic oil gun to spray preservative oil (WP 0126, Item 32) into air inlet for one minute. Release dead crank switch. Connect manifold in hose.

15. Remove air cleaner cover and both filter elements (WP 0071) Set DEAD CRANK SWITCH to CRANK to turn over engine, use a pneumatic oil gun to spray preservative oil (WP 0124, Item 32) into air cleaner housing for 30 seconds. Release dead crank switch. Install both filter elements and air cleaner cover.

16. Allow muffler to cool. Use a pneumatic oil gun to spray preservative oil (WP 0124, Item 32) into exhaust outlet housing for 30 seconds.

17. On left side of TQG, place a suitable container under the fuel drain. Remove cap from fuel drain and open the fuel drain valve. Completely drain the fuel tank. Close fuel drain valve and install cap to first locking position.

18. Completely drain cooling system (WP 0068).

19. Apply preservative oil (WP 0124, Item 32) to all hinges and latches on the TQG.

20. Disconnect all battery cables from batteries (WP 0050). Secure battery cable terminals away from the batteries with tape. Apply petroleum jelly to all battery terminals.

21. Close all doors.

22. Prepare tag with the following statements: “CRANKCASE FILLED WITH PRESERVATIVE OIL (MIL-PRF-21260, GRADE 30). GOOD FOR OPERATION UNTIL FIRST REQUIRED OIL CHANGE.”

23. Prepare tag with the following statements: “COOLING SYSTEM DRAINED. FILL WITH PROPER ANTIFREEZE MIXTURE BEFORE OPERATION.”

24. Prepare tag with the following statements: “FUEL SYSTEM PRESERVED WITH PRESERVATIVE OIL (MIL-PRF-21260, GRADE 10W). DRAIN FUEL LINES BEFORE OPERATING. CHANGE FUEL FILTER AFTER ONE HOUR OF OPERATION.

25. Place all the above tags on the control panel and secure with tape.

26. Secure all doors with tape.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
ILLUSTRATED LIST OF MANUFACTURED ITEMS

INITIAL SETUP:

Not Applicable

INTRODUCTION

Scope

This work package includes complete instructions for making items authorized to be manufactured or fabricated at the field level maintenance.

How to Use the Index of Manufactured Items

A part number index in alphanumeric order is provided for cross-referencing the part number of the item to be manufactured to the page which covers fabrication criteria.

Explanation of the Illustrations of Manufactured Items

All instructions needed by maintenance personnel to manufacture the item are included on the illustrations. All bulk materials needed for manufacture of an item are listed by part number or specification number in a tabular list on the illustration.

Table 1. Index of Manufactured Items.

ITEM NO.	PART NO.	NAME	PAGE NO.
		Not Applicable	

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

TORQUE LIMITS

INTRODUCTION

This work package contains the torque standards for specific types and sizes of hardware. It defines the different types of bolts by grade. Special torque values and sequences are listed in the specific maintenance procedure.

TORQUE TABLES

How To Use Torque Tables 1 and 2

1. Measure diameter of screw being installed (Figure 1).

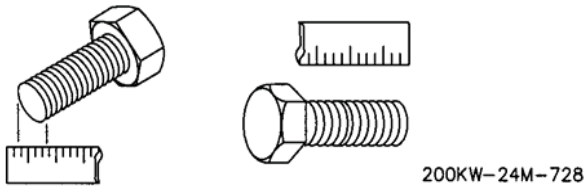

Figure 1. Measuring Screw.

2. Count number of threads per inch (TPI) or use a pitch grade.

3. Under heading SIZE, look down DIA IN. column until you find diameter of screw being installed. (There will usually be two lines beginning with same size.)

4. Under heading SIZE, look down TPI column to find numbers of threads per inch that match number of threads counted in step 2. (Not required for metric screws.)

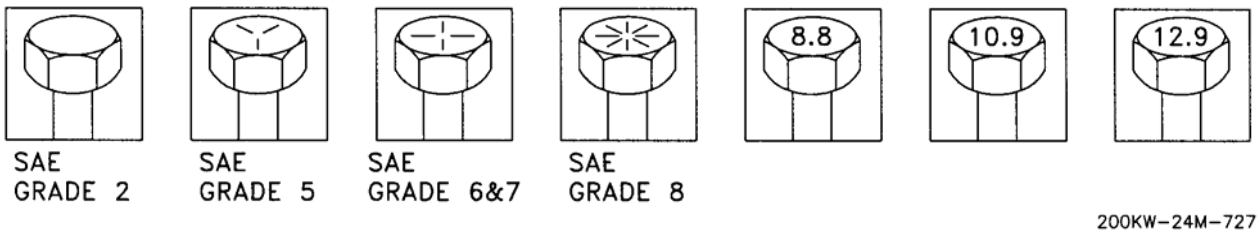

Figure 2. Capscrew Head Markings.

NOTE

Manufacturer's marks may vary. Standard is all SAE Grade 5 (3-line). Metric screws are of three grades: 8.8, 10.9, and 12.9. Grades and manufacturer's marks appear on the screw head.

5. To find the grade screw being installed, match markings on screw head to correct picture of CAPSCREW HEAD MARKINGS in Figure 2.

TORQUE TABLES - Continued

Table 1. Standard Dry Torque Limits.

SIZE			SAE GRADE NO. 2		SAE GRADE NO. 5		SAE GRADE NO. 6 OR 7		SAE GRADE NO. 8	
DIA IN.	TPI	DIA MM	LB-FT	NM	LB-FT	NM	LB-FT	NM	LB-FT	NM
1/4	20	6.35	5	7	8	11	10	14	12	16
1/4	28	6.35	6	9	10	14	12	16	14	19
5/16	18	7.94	11	15	17	23	21	28	25	34
5/16	24	7.94	12	16	19	26	24	33	25	34
3/8	16	9.53	20	27	30	41	40	54	45	61
3/8	24	9.53	23	31	35	47	45	61	50	68
7/16	14	11.11	30	41	50	68	60	81	70	95
7/16	20		35	47	55	75	70	95	90	108
1/2	13	12.70	50	68	75	102	95	129	110	149
1/2	20		55	75	90	122	100	135	120	163
9/16	12	14.29	65	85	110	149	135	183	150	203
9/16	18		75	102	120	163	150	203	170	231
5/8	11	15.88	90	122	150	203	190	258	220	298
5/8	18		100	136	180	244	210	285	240	325
3/4	10	19.05	160	217	260	353	240	434	380	515
3/4	16		180	244	300	407	360	488	420	597
7/8	9	22.23	140	190	400	542	520	705	600	814
7/8	14		155	210	440	597	580	786	660	895
1	8	25.40	220	298	580	786	800	1085	900	1220
1	12		240	325	640	868	860	1166	1000	1350
1-1/8	7	25.58	300	407	800	1085	1120	1519	1280	1736
1-1/8	12		340	461	880	1193	1260	1709	1440	1953

TORQUE TABLES - Continued

Table 1. Standard Dry Torque Limits - Continued.

SIZE			SAE GRADE NO. 2		SAE GRADE NO. 5		SAE GRADE NO. 6 OR 7		SAE GRADE NO. 8	
DIA IN.	TPI	DIA MM	LB-FT	NM	LB-FT	NM	LB-FT	NM	LB-FT	NM
1-1/4	7	31.75	420	570	1120	1519	1580	2142	1820	2468
1-1/4	12		460	624	1240	1681	1760	2387	2000	2712
1-3/8	6	34.93	560	759	1460	1980	2080	2820	2380	3227
1-3/8	12		640	868	1680	2278	2360	3227	2720	3668
1-1/2	6	38.10	740	1003	1940	2631	2780	3770	3160	4285
1-1/2	12		840	1139	2200	2983	3100	4204	3560	4827

Table 2. Metric Dry Torque Limits.

SIZE		METRIC GRADE 8.8		METRIC GRADE 10.9		METRIC GRADE 12.9	
DIA IN.	DIA MM	LB-FT	NM	LB-FT	NM	LB-FT	NM
0.157	4	2	3	3	4	4	5
0.197	5	4	5	6	8	7	9
0.237	6	7	9	10	14	11	15
0.276	7	11	15	16	32	20	27
0.315	8	18	24	25	34	29	39
0.394	10	32	43	47	64	58	79
0.473	12	58	79	83	113	100	136
0.630	16	144	195	196	266	235	319
0.709	18	190	258	269	365	323	438
0.788	20	260	353	366	496	440	597

TORQUE TABLES - Continued

Table 2. Metric Dry Torque Limits - Continued.

SIZE		METRIC GRADE 8.8		METRIC GRADE 10.9		METRIC GRADE 12.9	
DIA IN.	DIA MM	LB-FT	NM	LB-FT	NM	LB-FT	NM
0.867	22	368	499	520	705	678	919
0.946	24	470	637	664	900	794	1077
1.064	27	707	959	996	1351	1235	1675
1.182	30	967	1311	1357	1840	1630	2210

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

WIRE LISTS

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Personnel Required

One

References

FO-1
FO-2
FO-3
FO-4
TM 55-1500-323-24

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery disconnect switch is OFF; DEAD CRANK SWITCH is OFF).

INTRODUCTION

This work package contains the wire lists for the 200 kW Tactical Quiet Generator Set (TQG). The wire lists are used in conjunction with the schematic diagrams (Figure FO-1 thru FO-4, located in the back of this manual) during troubleshooting and repair of the TQG. All wiring information is provided, including wire color, wire gauge, wire type by part number/specification, and wire splice data. The wire lists are double ended which lists each wire path twice. The second wire path listing transposes the origin and destination components. Double ending a wire list facilitates locating a particular wire path by permitting a search for either component as the origin.

INTRODUCTION - Continued

Notes peculiar to each wire list are located on the first page of each wire list.

Location diagrams of the engine sensors and connector diagrams are on the following five pages, ahead of the wire lists.

This work package contains the following wire lists:

Table 1. Control Panel Wire List
Table 2. Generator Set Harness (Generator, Engine, Control Panel) Wire List
Table 3. ECM to EMCP Harness Wire List
Table 4. Engine Harness Wire List
Table 5. Engine Harness to Unit Injectors Wire List
Table 6. Winterization Control Panel Wire List
Table 7. Winterization Kit Heater Cable Wire List
Table 8. Winterization Kit Power Cable Wire List

GENERAL WIRING REPAIR PROCEDURES

The following general procedures should be followed as a guide to wiring repair and troubleshooting. Detailed repair procedures and the use of standard repair tools and methods are found in TM 55-1500-323-24 (TO 1-1A-14/NAVAIR 01-1A-505).

1. Verify that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery disconnect switch is OFF; DEAD CRANK SWITCH is OFF).
2. Tag and identify all wires before removing or disconnecting.
3. Inspect wire labels and replace if missing or damaged.
4. Verify continuity of wires point to point using digital multimeter.
5. Inspect all wires for breaks, nicks, abrasions, and heat damage.
6. Inspect wiring for signs of arcing or electrical damage.
7. Tighten all connectors and check for cracks, signs of electrical damage, or missing pins or sockets.
8. Inspect for loose connections at electrical components and tighten as necessary.
9. Inspect terminal board connections and tighten spade connectors as necessary.
10. Inspect wire harnesses and ensure that wire ties are not broken or removed.
11. Replace wire ties as necessary to prevent wires from chafing or other damage.

HARNESS INSPECTION PROCEDURES

Most electrical problems are caused by poor connections. The following procedure will assist in detecting problems with connectors and wiring. If a problem is found, correct the condition and verify that the problem is resolved. Intermittent electrical problems are sometimes resolved by disconnecting and reconnecting connectors. It is very important to check for diagnostic codes immediately before disconnecting a connector. Also check for diagnostic codes after reconnecting the connector. If the status of a diagnostic code is changed due to disconnecting and reconnecting a connector, there are several possible reasons. The likely reasons are loose terminals, improperly crimped terminals, moisture, corrosion, and inadequate mating of a connection. Follow these guidelines:

1. Always use the correct tools designed for each connector. Never solder the terminals onto the wires.

2. Always use a breakout harness for a voltmeter probe or a test light. Never break the insulation of a wire in order to access to a circuit for measurements.

3. If a wire is cut, always install a new terminal as part of the repair.

WARNING

The connection or disconnection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard which may result in injury or death. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere.

Moisture and Corrosion Inspection

1. Inspect all wiring harnesses. Ensure that the routing of the wiring harness allows the wires to enter the face of each connector at a perpendicular angle. Otherwise, the wire will deform the seal and will create a path for the entrance of moisture. Verify that the seals for the wires are sealing properly.

2. Ensure that the sealing plugs are in place. If any of the plugs are missing, replace the plug. Ensure that the plugs are inserted correctly into the connector.

3. Disconnect the suspect connector and inspect the connector seal. Ensure that the seals are in good condition. If necessary, replace the connector.

4. Thoroughly inspect the connectors for evidence of moisture.

NOTE

Minor abrasion on connector seals is normal and will not allow the entry of moisture.

5. If moisture or corrosion is evident in the connector, the source of the moisture must be found and repaired. If the source of the moisture is not repaired, the problem will recur. Simply drying the connector will not fix the problem. Check the following items for possible moisture entry.

    a. Missing or improperly installed seals.

    b. Nicks in exposed insulation

    c. Improperly mated connectors

HARNESS INSPECTION PROCEDURES - Continued

6. Moisture can also travel to a connector through the inside of a wire. If moisture is found in a connector, thoroughly check the connector's harness for damage. Also check other connectors that share the harness for moisture. Repair the connectors or the wiring, as required. Ensure that all of the seals are properly in place and that the connectors have been reconnected.

NOTE

The ECM is a sealed unit. If moisture is found in an ECM connector, the ECM is not the source of the moisture. Do not replace the ECM.

7. If corrosion is evident on the terminals or the connector, use only denatured alcohol to remove the corrosion. Use a cotton swab or a soft brush to remove the corrosion.

8. If moisture was found in the connectors, run the engine for several minutes and check again for moisture. If moisture reappears, the moisture is wicking into the connector. Even if the moisture entry path is repaired, it may be necessary to replace the wires.

Wire Insulation Damage Inspection

1. Carefully inspect each wire for signs of abrasion, of nicks, and of cuts. Inspect the wires for the following conditions:

   a. Exposed conductors

   b. Wire rubbing against the engine

   c. Wire rubbing against a sharp point

2. Check all wiring harness fasteners and verify that the harness is properly secured. Also check all of the fasteners and verify that the harness is not compressed. Pull back the harness sleeves in order to check for a flattened portion of wire. A fastener that has been over-tightened flattens the harness. This damages the wires that are inside the harness. Repair or replace damaged wires, as required.

Connector Terminal Inspection

Visually inspect each terminal in the connector. Verify that the terminals are not damaged. Verify that the terminals are properly aligned in the connector and verify that the terminals are properly located in the connector. Repair the terminals and/or replace the terminals, as required.

Wire Terminal Connection Pull Test

1. Ensure that the locking wedge for the connector is installed properly. Terminals cannot be retained inside the connector if the locking wedge is not installed properly.

2. Conduct an adequate pull test on each wire. Each terminal and each connector should easily withstand 10 lb (45 N) of tension and each wire should remain in the connector body. This test checks whether the wire was properly crimped in the terminal and whether the terminal was properly inserted into the connector. Replace damaged connectors, as required.

HARNESS INSPECTION PROCEDURES - Continued

Terminal Retention into Socket Inspection

Verify that the connector sockets provide good retention for the terminals. Insert a new terminal into each connector socket one at a time in order to check for a good grip on the terminal by the socket. If a new terminal is not secure in the connector socket, replace the connector.

Connector Locking Mechanism Inspection

1. Ensure that the connectors lock properly. After locking the connectors, ensure that the two mating connector sections cannot be pulled apart. Repair the connector or replace the connector, as required.

2. Verify that the latch tab of the connector is properly latched. Also verify that the latch tab of the connector returns to the locked position. Repair the connector or replace the connector, as required.

Connector Allen Head Screw Inspection

1. Visually inspect the allen head screws on the ECM connectors (Figure 2, Sheet 2).

2. Ensure that the threads on each allen head screw are not damaged.

3. Connect the engine harness connectors to the ECM connectors J1 and J2. Connect P37 to J37.

    a. Torque the allen head screw for the ECM harness connectors to 55.0 +13.0 –4.0 lb in. (6.0 +1.5 -0.5 Nm). If connector cannot be tightened, repair or replace the connector, as required.

    b. Torque the allen head screw for the ECM harness connector J37 to 20.0 ±2.0 lb in. (2.25 ± 0.25 Nm). If connector cannot be tightened, repair or replace the connector, as required.

HARNESS INSPECTION PROCEDURES - Continued

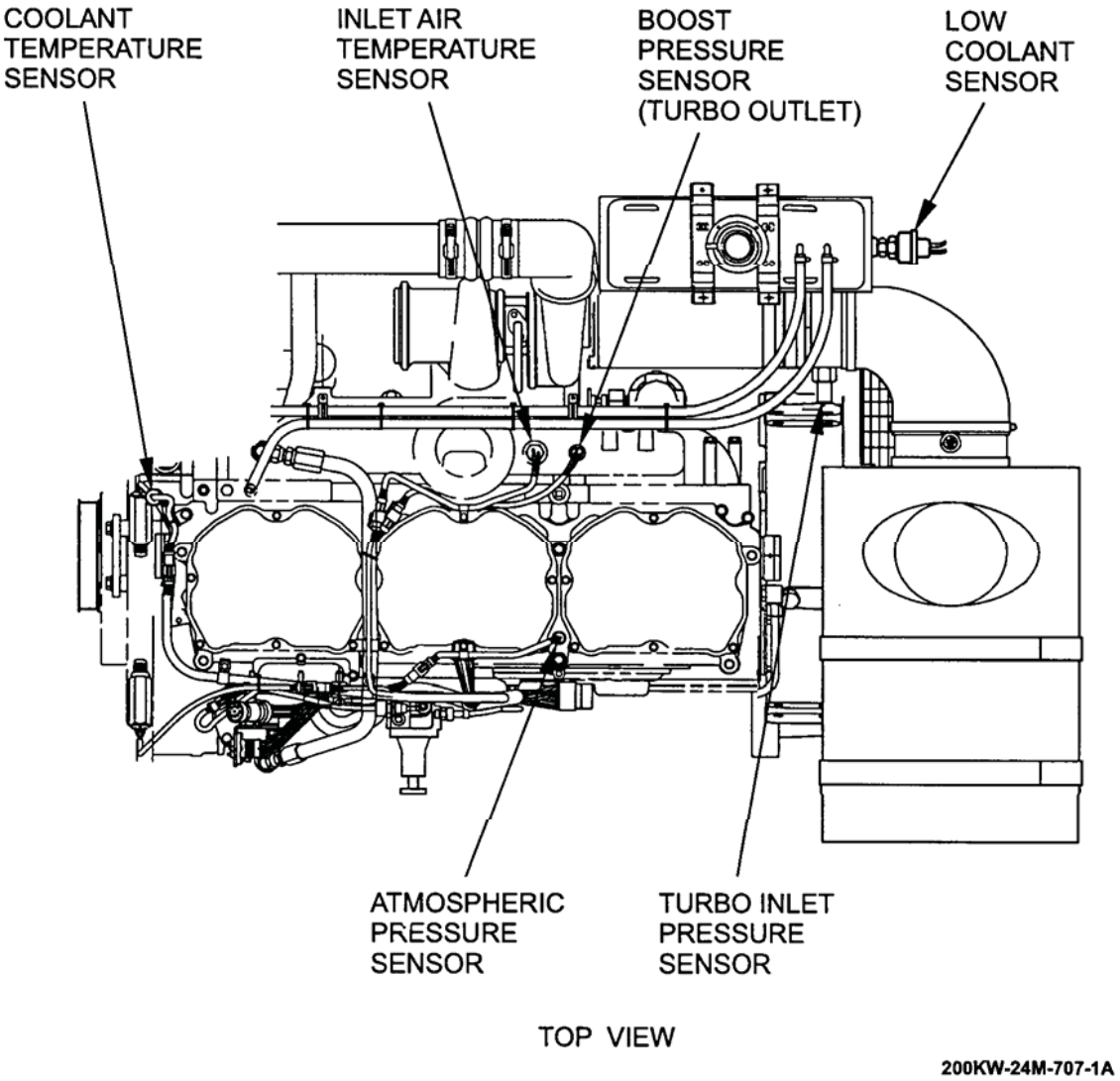

Figure 1. Engine Sensors (Sheet 1 of 2).

HARNESS INSPECTION PROCEDURES - Continued

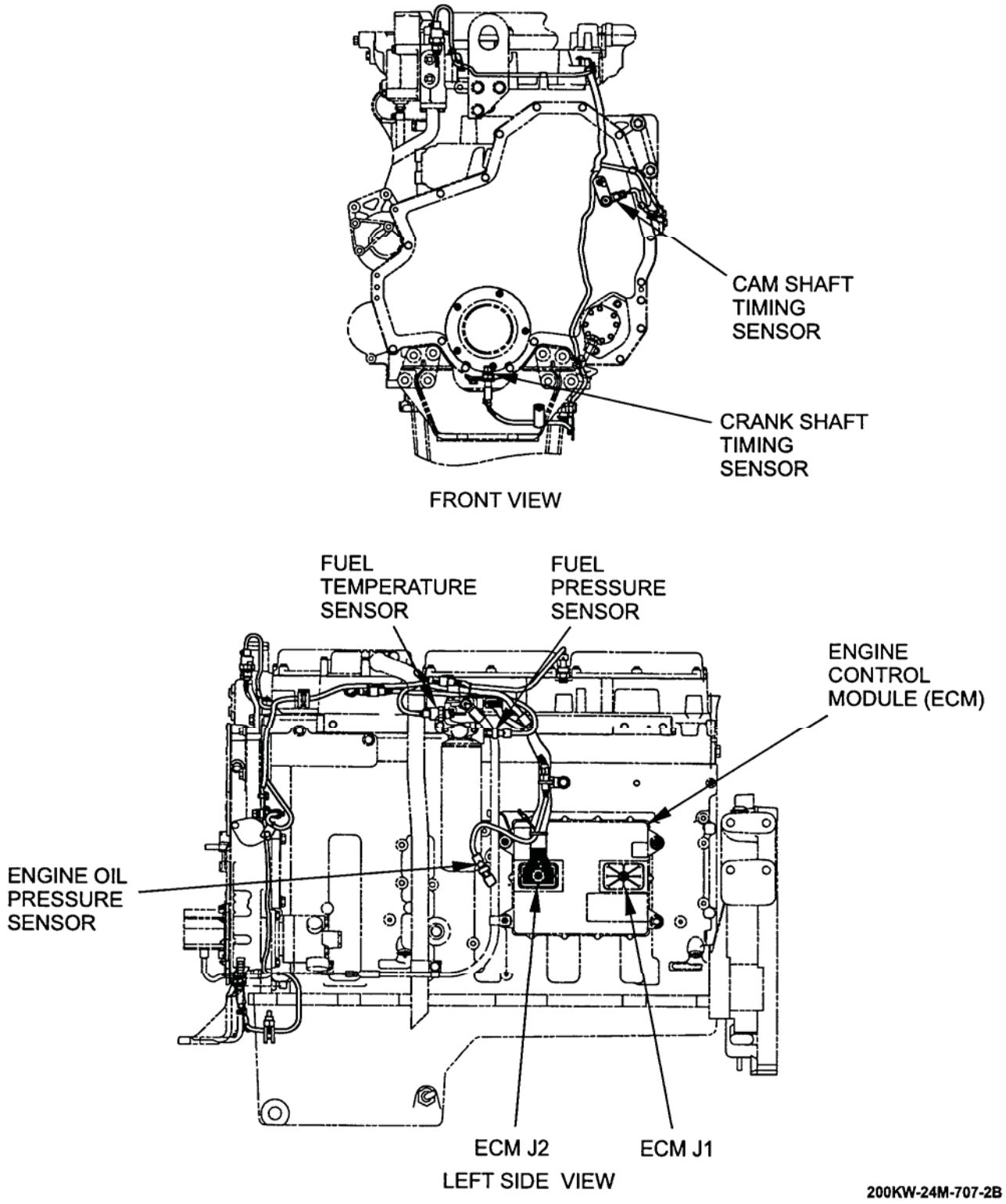

Figure 1. Engine Sensors (Sheet 2 of 2).

HARNESS INSPECTION PROCEDURES - Continued

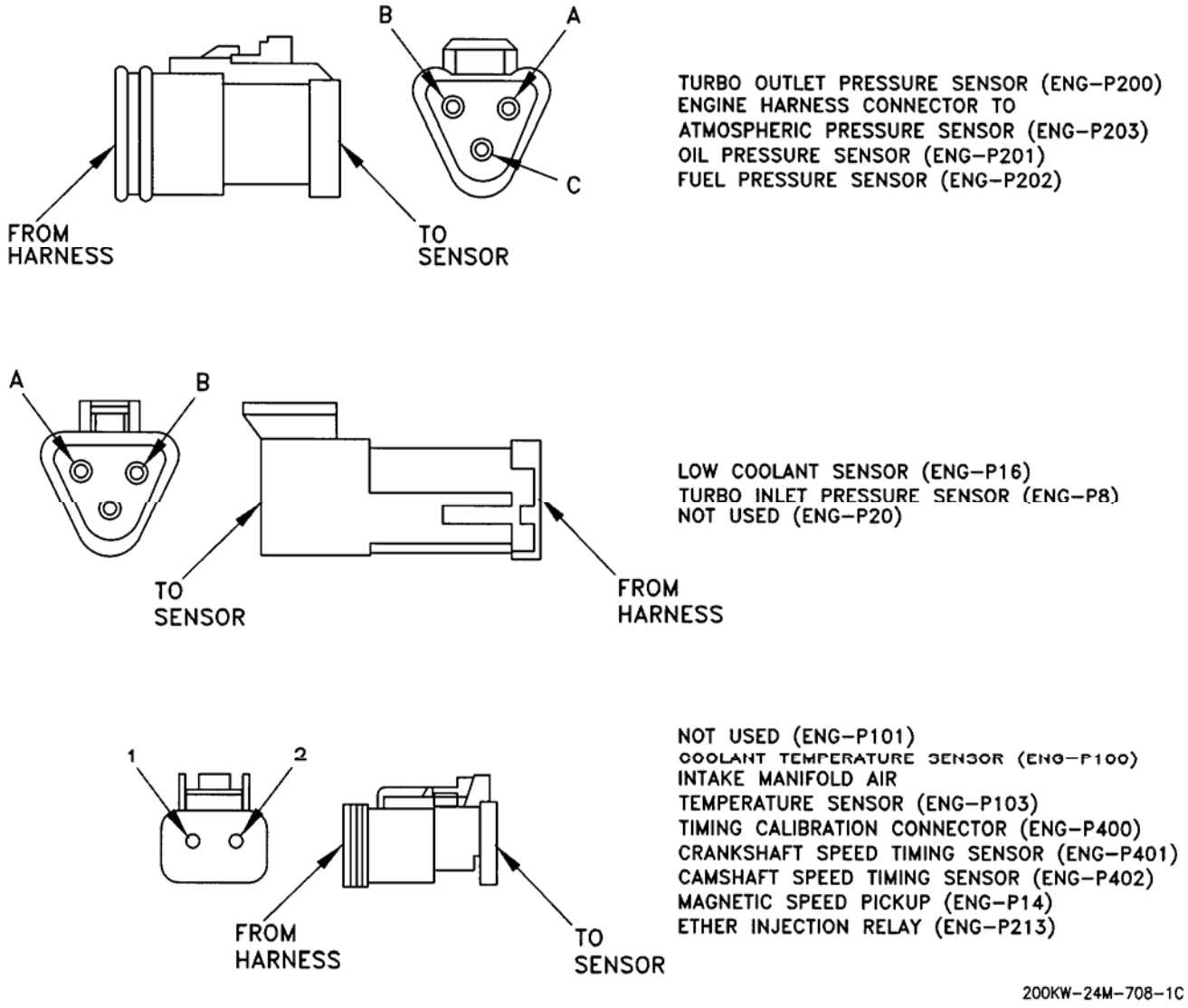

Figure 2. Wire Harness Connectors (Sheet 1 of 3).

HARNESS INSPECTION PROCEDURES - Continued

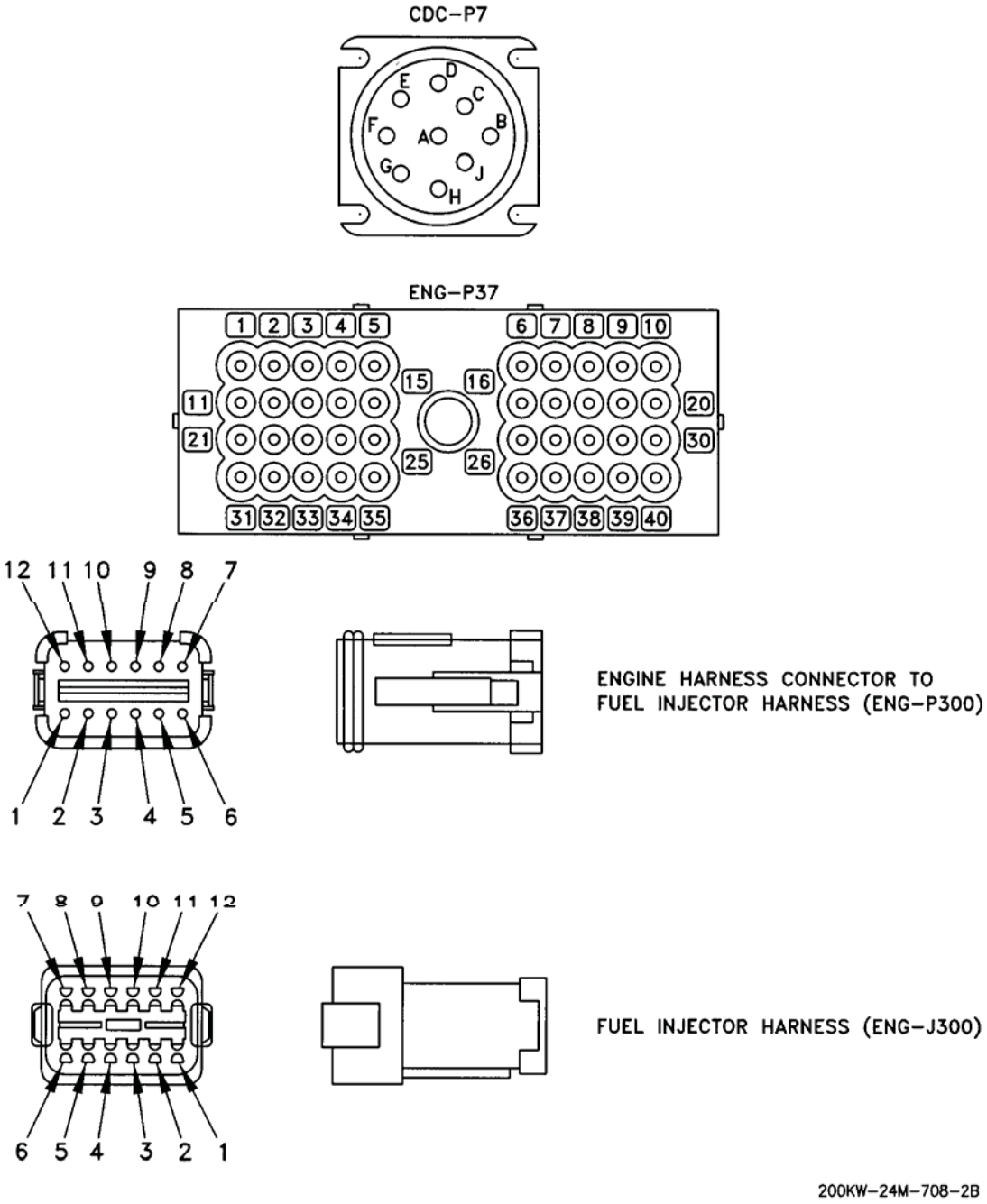

Figure 2. Wire Harness Connectors (Sheet 2 of 3).

HARNESS INSPECTION PROCEDURES - Continued

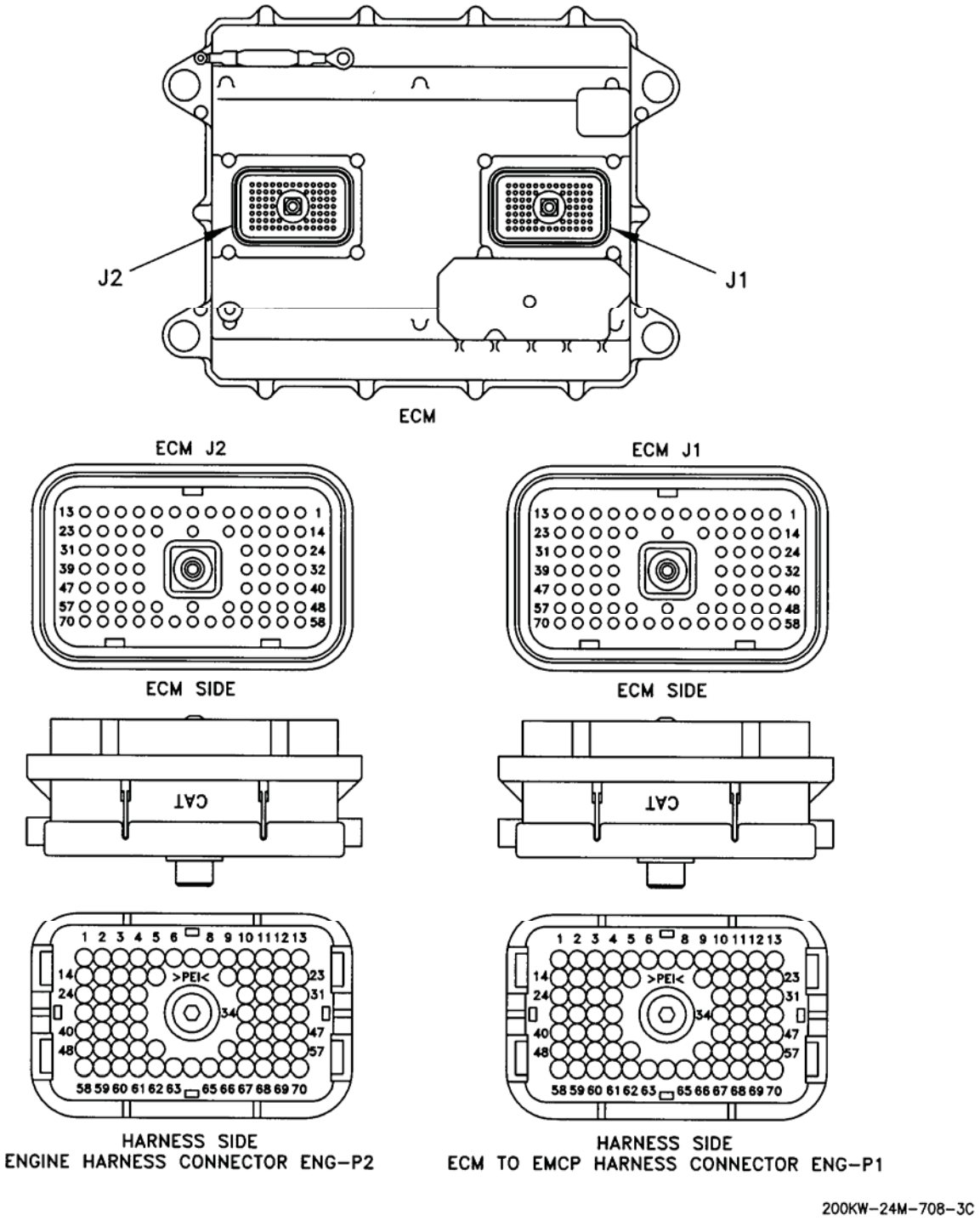

Figure 2. Wire Harness Connectors (Sheet 3 of 3).

Table 1. Control Panel Wire List.

NOTES

Color Code

0 Black	5 Green
1 Brown	6 Blue
2 Red	7 Violet
3 Orange	8 Gray
4 Yellow	9 White

Abbreviations used in table can be found in FO-1 at the back of this manual or in List of Abbreviations/Acronyms (WP 0001).

The list below describes End Prep in Table 1:

Code	Part Number	Nomenclature
1	88-20274-1	Terminal, Spade, 22-18 AWG #6
2	88-20274-5	Terminal, Spade, 16-14 AWG #6
3	88-20274-10	Terminal, Spade, 12-10 AWG #6
4	88-2219-18	Terminal, Ring Tongue, 16-14 AWG 1/4
5	0116-1201-19	Socket, Connector
6	88-21943	Pin
7	0116-1201-17	Plug, Seal
8	0116-1223	Pin, Connector
9	0116-1201-16	Pin, Connector
10	98-19529-02	Contact, Electrical, Female, 18-24 AWG
11	88-20274-11	Terminal, Spade, 16-14 AWG #8
12	88-20274-6	Terminal, Spade, 16-14 AWG #10
13	88-22119-17	Terminal Lug, Ring Tongue 12-10 AWG 1/4
14	88-20274-3	Terminal, Spade, 22-18 AWG #8
15	88-20274-4	Terminal, Spade, 22-18 AWG #10
16	MS25036-102	Terminal Lug
17	-	Solder to terminal
18	0116-1207-02	Contact, Electrical, Male

The list below describes Wire Type column in Table 1:

Wire Code	Nomenclature	Part Number
A	Wire, Electric, 14 Ga	M22759/16-14-9
B	Wire, Electric, 16 Ga	M22759/16-16-9
C	Wire, Electric, 18 Ga	M22759/16-18-9
D	Wire, Electric, 10 Ga	M22759/16-10-9
E	Cable, Shielded 2 Conductor, 18 AWG	0116-1262-01
F	Cable, Shielded 3 Conductor, 18 AWG	0116-1262-02

Table 1. Control Panel Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
A1	B+	4	A	14	9			TB4	22B	27C14
A1	1	1	C	18	9			AR	1	41E18
A1	2		A	14	9			A1	B (+)	
A1	10	2	B	16	9			A1	24	61A16
A1	13	1	C	18	9			TB3	14B	44C18
A1	14	1	C	18	9			J37	26	45A18
A1	18	1	C	18	9			KFF	12	14A18
A1	22	1	C	18	9			GFR	14	43A18
A1	24	2	B	16	9			A1	10	61A16
A1	26	2	B	16	9			TB4	11A	54A16
A1	27	1	C	18	9			TB3	7A	2AL18
A1	28		A	14	9			A1	B (-)	-
A1	28						SH9$	511 SHIELD	GND	
A1	28						SH10$	512 SHIELD	GND	
A1	28						SH4$	504 SHIELD	GND	
A1	29		A	14	9			A1	B (+)	
A1	38	1	C	18	9			TB4	21A	27F18
A1	38	1	C	18	9			TB4	21A	27F18
A1	39	2	A	14	9			TB4	19B	21AI4
A1	B(-)	4	B	16	9			CB	GND	2J16
A1	B(-)	4	B	16	9			CP	GND	2K16
A2	1	1	C	18	9			TB4	19B	21H18
A2	4	1	C	18	9			TB3	19A	4A18

Table 1. Control Panel Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
A2	12	1	C	18	9			AR	13	3A18
A2	7	1	C	18	9			TB3	5A	2AG18
A2	8	1	C	18	9			P51	18	5A18
A2	9	1	C	18	9			P51	5	6A18
A3	B(-)	1	C	18	9			TB3	9A	2AT18
A3	B+	1	C	18	9			TB4	18A	21L18
A3	F1	2	A	14	9			TB3	22B	99A14
A3	F2	2	A	14	9			TB3	21B	98A14
A3	GND	2	A	14	9			CB	GND	2BN14
A3	3	2	E	18	9			P7	24	34A18
A3	5	2	B	16	9			A7	5	116A16
A3	6	2	B	16	9			A7	6	115A16
A3	7	1	E	18	2		SH5	VAR	3	505
A3	20	2	B	16	9			TB4	6B	109D16
A3	22	2	B	16	9			TB4	8B	107D16
A3	24	2	B	16	9			TB4	7B	108D16
A3	26	2	A	14	9			J31	6	135A14
A3	28	2	A	14	9			J31	7	136A14
A3	30	2	A	14	9			J31	5	134A14
A3	45	1	E	-	-		SH5$	Dead		
A3	45	1	E	18	9		SH5	VAR	1	505
A4	GND	1	C	18	9			TB3	5A	2AA18
A4	1	1	C	18	9			TB4	8A	107E18
A4	2	1	C	18	9			TB4	7A	108E18
A4	3	1	C	18	9			TB4	6A	109H18
A4	4	2	B	16	9			J31	16	111B16

Table 1. Control Panel Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
A4	5	2	B	16	9			P51	2	127A16
A4	6	2	B	16	9			J31	15	112B16
A4	7	2	B	16	9			P51	1	128A16
A4	8	2	B	16	9			J31	18	113B16
A4	9	2	B	16	9			P51	12	129A16
A4	10	1	E	18	2		SH1	PAR	10	501
A4	11	1	E	18	9		SH1	PAR	9	501
A4	12	1	E	-	-		SH1$	Dead End		501
A4	13	1	C	18	9			A7	1	137A18
A4	14	1	C	18	9			J30	32	139A18
A4	15	2	A	14	9			TB4	19A	21C14
A4	16	2	A	14	9			TB3	4A	2T14
A4	19	1	E	18	2		SH8	J37	23	508
A4	20	1	E	18	9		SH8	J37	11	508
A4	21	1	F	-	-		SH6$	Dead End		506
A4	21	1	E	-	-		SH7$	Dead End		507
A4	21	1	E	-	-		SH8$	J37	12	508
A4	24	1	E	18	2		SH7	P7	27	507
A4	25	1	E	18	9		SH7	P7	28	507
A4	25	2	B	16	9			TB3	9A	2AW16
A4	26	1	F	18	0		SH6	SSP	3	506
A4	27	1	F	18	9		SH6	SSP	2	506
A4	28	1	F	18	2		SH6	SSP	1	506
A5	F1	14	C	18	9			J31	1	101D18

Table 1. Control Panel Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
A5	F2	14	C	18	9			J31	3	102D18
A5	F3	14	C	18	9			J31	12	103D18
A5	H21	1	C	18	9			TB4	2A	110G18
A5	TBC 50	2	B	16	9			J31	14	150B16
A5	TBC 51	2	B	16	9			J31	4	151B16
A5	TBC 52	2	B	16	9			J31	9	152B16
A5	TBC 53	2	B	16	9			J31	13	153B16
A5P1	1	9	C	18	9			P7	10	149A18
A5P1	2	9	C	18	9			P7	11	148A18
A5P1	3	9	C	18	9			P7	12	147A18
A5P1	4	9	C	18	9			P7	4	144A18
A5P1	5	9	C	18	9			P7	5	145A18
A5P1	6	9	C	18	9			P7	6	146A18
A5P1	7	9	C	18	9			P7	16	110E18
A5P1	8	9	C	18	9			A6P1	C	110D18
A6	B21	1	C	18	9			TB4	1A	110F18
A6	F1	14	C	18	9			J31	19	121D18
A6	F2	14	C	18	9			DBHI	14	123F18
A6P1	A	9	C	18	9			P7	17	155A18
A6P1	B	9	C	18	9			P7	18	156A18
A6P1	C	9	C	18	9			A5P1	8	110D18
A7	1	1	C	18	9			A4	13	137A18
A7	11	2	A	14	9			J30	9	17B14
A7	12	2	A	14	9			TB4	22A	27B14
A7	2	1	C	18	9			J30	31	138B18
A7	3	1	C	18	9			DBHI	4	122E18
A7	4	1	C	18	9			DBHI	13	154A18

Table 1. Control Panel Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
A7	5	2	B	16	9			A3	5	116A16
A7	5	2	B	16	9			J30	35	116B16
A7	6	2	B	16	9			A3	6	115A16
A7	6	2	B	16	9			J30	36	115B16
A7	8	1	C	18	9			KFF 8	8	15A18
A7	9	1	C	18	9			TB3	22A	99D18
AFPR	5	1	C	18	9			TB4	20A	21E18
AFPR	8	1	C	18	9			J30	2	10Al8
AFPR	9	1	C	18	9			J30	1	8A18
AFPR	12	1	C	18	9			AFPR	14	11B18
AFPR	13	1	C	18	9			TB3	1B	2U18
AFPR	14	1	C	18	9			AFPR	12	11B18
AFPR	14	1	C	18	9			J30	3	11A18
AFPS	1	1	C	18	9			J30	5	69A18
AFPS	2	1	C	18	9			TB4	18B	21K18
AR	1	1	C	18	9			A1	1	41E18
AR	1	1	C	18	9			TB4	16B	41D18
AR	9	1	C	18	9			P51	8	42A18
AR	13	1	C	18	9			A2	12	3A18
AR	14	1	C	18	9			TB4	20A	21F18
BSS	1	2	C	18	9			TB3	16B	56A18
BSS	2	2	C	18	9			GFR	9	52B18
BSS	4	1	C	18	9			J37	35	73A18
BSS	5	1	C	18	9			TB3	3B	2AS18

Table 1. Control Panel Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
CB	GND	14	A	14	9			A3	GND	2BN14
CB	GND	4	B	16	9			AI	B(-)	2J16
CB	GND	13	D	10	9			TB3	4A	2H10
CCL	1	17	C	18	9			TB4	22B	27D18
CCL	2	17	C	18	9			TB3	12B	68B18
CCL	3	17	C	18	9			TB3	8B	2AX18
CCS	1	2	C	18	9			PSU	2	65A18
CCS	2	2	C	18	9			TB4	15B	49B18
CCS	4	2	C	18	9			TB4	15B	49A18
CCS	5	2	C	18	9			TB3	16B	56B18
CDR	4	2	C	18	9			TB4	11B	54D18
CDR	12	1	C	18	9			KR	14	36A18
CDR	13	1	C	18	9			P7	36	78A18
CDR	14	2	C	18	9			KR	12	54C18
CP	GND	11	B	16	9			A1	B(-)	2K16
DBHI	1	1	C	18	9			DBLO	1	58A18
DBHI	2	1	C	18	9			P7	29	29A18
DBHI	4	1	C	18	9			A7	3	122E18
DBHI	4	1	C	18	9			J31	8	122D18
DBHI	9	1	C	18	9			PSU	3	57A18
DBHI	10	1	C	18	9			DBLO	12	59A18
DBHI	12	1	C	18	9			DBLO	13	157A18
DBHI	13	1	C	18	9			A7	4	154A18
DBHI	14	1	C	18	9			A6	F2	123F18

Table 1. Control Panel Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
DBHI	14	1	C	18	9			DBLO	14	123E18
DBLO	1	1	C	18	9			DBHI	1	58A18
DBLO	4	1	C	18	9			TB3	3B	2Y18
DBLO	9	1	C	18	9			TB3	4B	2Z18
DBLO	12	1	C	18	9			DBHI	10	59A18
DBLO	13	1	C	18	9			DBHI	12	157A18
DBLO	14	1	C	18	9			DBHI	14	123E18
DBLO	14	1	C	18	9			J31	17	123D18
DCA	(-)	4	C	18	9			J30	24	24G18
DCA	(+)	4	C	18	9			J30	25	25D18
ECS	1	15	C	18	9			TB3	6A	2AJ18
ECS	2	15	C	18	9			P7	39	39A18
ECS	3	15	C	18	9			P7	40	40A18
ECS	4	7	C	18	9			TB3	17B	33B18
ECS	5	15	C	18	9			P7	32	32A18
ECS	6	15	C	18	9			TB4	21B	27H18
ECS	8	15	C	18	9			TB4	16A	41A18
ECS	9	15	C	18	9			TB4	16A	41B18
ECS	10	15	C	18	9			TB4	16B	41C18
End	-	505	-							
ESPB	1	1	C	18	9			KFF	14	14C18
ESPB	1A	1	C	18	9			TB3	14B	44A18
ESPB	2	1	C	18	9			J30	15	60A18
ESPB	2A	1	C	18	9			TB3	6A	2AH18

Table 1. Control Panel Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
ESPB	3	1	C	18	9			P7	38	38A18
ESPB	4	1	C	18	9			TB3	7A	2AK18
FLG	G	14	C	18	9			TB3	5B	2AB18
FLG	I	14	C	18	9			TB4	20B	21D18
FLG	S	14	C	18	9			J30	7	80B18
GFR	1	2	C	18	9			P51	10	53A18
GFR	9	2	C	18	9			BSS	2	52B18
GFR	9	2	C	18	9			P51	7	52A18
GFR	13	1	C	18	9			TB3	1B	2V18
GFR	14	1	C	18	9			A1	22	43A18
J101	G	11	C	16	9			TB3	7B	2AV16
J30	1	6	C	18	9			AFPR	9	8A18
J30	2	6	C	18	9			AFPR	8	10Al8
J30	3	6	C	18	9			AFPR	14	11A18
J30	4	6	C	18	9			TB3	19A	4C18
J30	5	6	C	18	9			AFPS	1	69A18
J30	7	6	C	18	9			FLG	S	80B18
J30	8	6	B	16	9			TB4	19A	21B16
J30	9	8	A	14	9			A7	11	17B14
J30	10	6	B	16	9			TB4	6A	109C16
J30	12	6	C	18	9			TB3	12A	68C18
J30	13	6	B	16	9			TB4	21A	27J16
J30	14	6	C	18	9			TB4	10A	76B18
J30	15	6	C	18	9			ESPB	2	60A18

Table 1. Control Panel Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
J30	16	8	A	14	9			TB4	5A	109F14
J30	17	8	A	14	9			TB4	1A	110M14
J30	18	6	B	16	9			TB4	17A	21M16
J30	19	6	C	18	9			TB4	15A	49C18
J30	20	6	B	16	9			TB3	4B	2S16
J30	23	6	B	16	9			KR	8	50A16
J30	24	6	C	18	9			DCA	(-)	25D18
J30	25	6	C	18	9			DCA	(+)	24G18
J30	28	8	A	14	9			TB3	21A	98C14
J30	29	8	A	14	9			TB3	22A	99C14
J30	31	6	C	18	9			A7	2	138B18
J30	32	6	C	18	9			A4	14	139A18
J30	33	7	C	18	9			TB3	17A	33C18
J30	34	6	B	16	9			TB4	7A	108C16
J30	35	6	B	16	9			A7	5	116B16
J30	36	6	B	16	9			A7	6	115B16
J30	37	6	B	16	9			TB4	8A	107C16
J31	1	6	C	18	9			A5	F1	101D18
J31	3	6	C	18	9			A5	F2	102D18
J31	4	6	B	16	9			A5	TBC-51	151B16
J31	5	8	A	14	9			A3	30	134A14
J31	6	8	A	14	9			A3	26	135A14
J31	7	8	A	14	9			A3	28	136A14
J31	8	6	C	18	9			DBHI	4	122D18

Table 1. Control Panel Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
J31	9	6	B	16	9			A5	TBC-52	152B16
J31	10	6	B	16	9			TB4	3A	110C16
J31	11	6	B	16	9			TB4	14A	114D16
J31	12	6	C	18	9			A5	F3	103D18
J31	13	6	B	16	9			A5	TBC-53	153B16
J31	14	6	B	16	9			A5	TBC-50	150B16
J31	15	6	B	16	9			A4	6	112B16
J31	16	6	B	16	9			A4	4	111B16
J31	17	6	C	18	9			DBLO	14	123D18
J31	18	6	B	16	9			A4	8	113B16
J31	19	6	C	18	9			A6	F1	121D18
J32	A	17	E	18	9		SH2	PAR	5	502
J32	B	17	E	18	2		SH2	PAR	6	502
J32	E	-	C	18	9			RP GND		2JA18
J33	A	17	E	18	9		SH3	PAR	5	503
J33	B	17	E	18	2		SH3	PAR	6	503
J33	E	-	C	18	9			RP GND		2JB18
J37	1	9	E	18	2		SH4	P7	1	504
J37	2	9	E	18	9		SH4	P7	2	504
J37	3	18	E	-	-		SH4$	A1	28	504
J37	7	9	C	18	9			P7	7	19A18
J37	8	9	C	18	9			P7	8	20AI8
J37	9	9	C	18	9			P7	9	9A18

Table 1. Control Panel Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
J37	11	9	E	18	9		SH8	A4	20	508
J37	12	18	E	-	-		SH8$	A4	21	508
J37	13	9	C	18	9			P7	13	13A18
J37	14	9	C	18	9			P7	14	16A18
J37	19	9	E	18	2		SH9	P7	19	511
J37	20	9	E	18	9		SH9	P7	20	511
J37	21	9	E	18	2		SH10	P7	21	512
J37	22	9	E	18	9		SH10	P7	22	512
J37	23	9	E	18	2		SH8	A4	19	508
J37	26	9	C	18	9			A1	14	45A18
J37	27	9	C	18	9			TB3	14A	44B18
J37	30	9	C	18	9			P7	30	18A18
J37	31	6	C	18	9			P7	31	31A18
J37	35	9	C	18	9			BSS	4	73A18
J37	40	9	B	16	9			TB4	17A	21N16
KFF	5	1	C	18	9			TB3	21A	98E18
KFF	8	1	C	18	9			A7	8	15A18
KFF	9	1	C	18	9			TB3	2B	2X18
KFF	12	1	C	18	9			A1	18	14A18
KFF	12	1	C	18	9			KFF	14	14B18
KFF	13	1	C	18	9			TB3	2B	2W18
KFF	14	1	C	18	9			ESPB	1	14C18

Table 1. Control Panel Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
KFF	14	1	C	18	9			KFF	12	14B18
KR	8	2	B	16	9			J30	23	50A16
KR	12	2	C	18	9			CDR	14	54C18
KR	12	2	B	16	9			TB4	11B	54B16
KR	13	6	C	18	9			P51	6	51A18
KR	14	1	C	18	9			CDR	12	36A18
P51	6	10	C	18	9			KR	13	51A18
P51	1	10	B	16	9			A4	7	128A16
P51	2	10	B	16	9			A4	5	127A16
P51	3	10	B	16	9			TB4	14B	114E16
P51	4	10	C	18	9			TB3	2A	2N18
P51	5	10	C	18	9			A2	9	6A18
P51	7	10	C	18	9			GFR	9	52A18
P51	8	10	C	18	9			AR	9	42A18
P51	9	10	C	18	9			TB3	3A	2M18
P51	10	2	C	18	9			GFR	1	53A18
P51	11	10	B	16	9			TB4	14B	114F16
P51	12	10	B	16	9			A4	9	129A16
P51	13	10	B	16	9			TB4	14A	114G16
P51	15	10	C	18	9			TB4	5A	109G18
P51	16	10	C	18	9			TB4	2A	110H18
P51	18	10	C	18	9			A2	8	5A18
P51	19	10	C	18	9			TB3	2A	2P18
P51	20	10	C	18	9			TB3	16A	56C18
P7	1	5	E	18	2		SH4	J37	1	504

Table 1. Control Panel Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
P7	2	5	E	18	9		SH4	J37	2	504
P7	4	5	C	18	9			A5P1	4	144A18
P7	5	5	C	18	9			A5P1	5	145A18
P7	6	5	C	18	9			A5P1	6	146A18
P7	7	5	C	18	9			J37	7	19A18
P7	8	5	C	18	9			J37	8	20AI8
P7	9	5	C	18	9			J37	9	9A18
P7	10	5	C	18	9			A5P1	1	149A18
P7	11	5	C	18	9			A5P1	2	148A18
P7	12	5	C	18	9			A5P1	3	147A18
P7	13	5	C	18	9			J37	13	13A18
P7	14	7	C	18	9			J37	14	16A18
P7	15	5	C	18	9			SMS	1	55A18
P7	16	5	C	18	9			A5P1	7	110E18
P7	17	5	C	18	9			A6P1	A	155A18
P7	18	5	C	18	9			A6P1	B	156A18
P7	19	5	E	18	2		SH9	J37	19	511
P7	20	5	E	18	9		SH9	J37	20	511
P7	21	5	E	18	2		SH10	J37	21	512
P7	22	5	E	18	9		SH10	J37	22	512
P7	23	7	C	18	9			TB3	19B	4D18
P7	24	5	C	18	9			A3	3	34A18
P7	25	5	C	18	9			TB3	12A	68D18
P7	26	5	C	18	9			SMS	6	46A18

Table 1. Control Panel Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
P7	27	5	E	18	2		SH7	A4	24	507
P7	28	5	E	18	9		SH7	A4	25	507
P7	29	5	C	18	9			DBHI	2	29A18
P7	30	5	C	18	9			J37	30	18A18
P7	31	5	C	18	9			J37	31	31A18
P7	32	5	C	18	9			ECS	5	32A18
P7	33	5	C	18	9			TB3	17B	33A18
P7	36	5	C	18	9			CDR	13	78A18
P7	37	5	C	18	9			SMS	11	47A18
P7	38	5	C	18	9			ESPB	3	38A18
P7	39	5	C	18	9			ECS	2	39A18
P7	40	5	C	18	9			ECS	3	40A18
PAR	5	1	E	18	9		SH2	J32	A	502
PAR	5	1	E	18	9		SH3	J33	A	503
PAR	6	1	E	18	2		SH2	J32	B	502
PAR	6	1	E	18	2		SH3	J33	B	503
PAR	9	1	E	18	9		SH1	A4	11	501
PAR	10	1	E	18	2		SH1	A4	10	501
PAR	13	1	C	18	9			PSU	5	64A18
PAR	14	1	C	18	9			TB4	22A	27E18
PL1	(-)	1	C	18	9			TB3	8A	2AM18
PL1	(+)	1	C	18	9			TB3	11B	30D18
PL2	(-)	1	C	18	9			TB3	8A	2AN18
PL2	(+)	1	C	18	9			TB3	11A	30B18

Table 1. Control Panel Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
PL3	(-)	1	C	18	9			TB3	8B	2AP18
PL3	(+)	1	C	18	9			TB3	11B	30C18
PLS	1	1	C	18	9			TB4	21B	27G18
PLS	2	1	C	18	9			TB3	11A	30A18
PSU	1	2	C	18	9			TB3	15A	48A18
PSU	2	1	C	18	9			CCS	1	65A18
PSU	3	1	C	18	9			DBHI	9	57A18
PSU	4	1	C	18	9			TB3	12B	68A18
PSU	5	1	C	18	9			PAR	13	64A18
RP	GND	15	C	18	9			TB3	9B	2AR18
RP	GND	-	C	18	9			J32E		2JA18
RP	GND	15	C	18	9			J33E		2JB18
RP	GND	15	E	-	-		SH2$	Dead End		502
RP	GND	15	E	-	-		SH3$	Dead End		503
SMS	1	15	C	18	9			P7	15	55A18
SMS	4	15	C	18	9			TB3	5B	2AC18
SMS	5	15	C	18	9			TB3	6B	2AD18
SMS	6	15	C	18	9			P7	26	46A18

Table 1. Control Panel Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
SMS	8	15	C	18	9			TB3	6B	2AE18
SMS	10	15	C	18	9			TB3	7B	2AF18
SMS	11	15	C	18	9			P7	37	47A18
SMS	13	2	C	18	9			TB3	15B	48C18
SMS	14	2	C	18	9			TB4	13A	63A18
SMS	15	12	C	18	9			TB3	15B	48B18
SSP	1	17	F	18	2		SH6	A4	28	506
SSP	2	17	F	18	9		SH6	A4	27	506
SSP	3	17	F	18	0		SH6	A4	26	506
TB3	1B	1	C	18	9			AFPR	13	2U18
TB3	1 B	1	C	18	9			GFR	13	2V18
TB3	2A	1	C	18	9			P51	4	2N18
TB3	2A	1	C	18	9			P51	19	2P18
TB3	2B	1	C	18	9			KFF	13	2W18
TB3	2B	1	C	18	9			KFF	9	2X18
TB3	3A	1	C	18	9			P51	9	2M18
TB3	3B	1	C	18	9			BSS	5	2AS18
TB3	3B	1	C	18	9			DBLO	4	2Y18
TB3	4A	3	D	10	9			CB	GND	2H10
TB3	4A	2	A	14	9			A4	16	2T14
TB3	4B	1	C	18	9			DBLO	9	2Z18
TB3	4B	1	B	16	9			J30	20	2S16
TB3	5A	1	C	18	9			A2	7	2AG18
TB3	5A	1	C	18	9			A4	GND	2AA18

Table 1. Control Panel Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
TB3	5B	1	C	18	9			FLG	G	2AB18
TB3	5B	1	C	18	9			SMS	4	2AC18
TB3	6A	1	C	18	9			ECS	1	2AJ18
TB3	6A	1	C	18	9			ESPB	2A	2AH18
TB3	6B	1	C	18	9			SMS	5	2AD18
TB3	6B	1	C	18	9			SMS	8	2AE18
TB3	7A	1	C	18	9			A1	27	2AL18
TB3	7A	1	C	18	9			ESPB	4	2AK18
TB3	7B	2	B	16	9			J101	3	2AV16
TB3	7B	1	C	18	9			SMS	10	2AF18
TB3	8A	1	C	18	9			PL1	(-)	2AM18
TB3	8A	1	C	18	9			PL2	(-)	2AN18
TB3	8B	1	C	18	9			CCL	3	2AX18
TB3	8B	1	C	18	9			PL3	(-)	2AP18
TB3	9A	1	C	18	9			A3	B(-)	2AT18
TB3	9A	2	B	16	9			A4	25	2AW16
TB3	9B	1	C	18	9			RP	GND	2AR18
TB3	10B	1	C	18	9			HTR2	1	2BM18
TB3	11A	1	C	18	9			PL2	(+)	30B18
TB3	11A	1	C	18	9			PLS	2	30A18
TB3	11B	1	C	18	9			PL1	(+)	30D18
TB3	11B	1	C	18	9			PL3	(+)	30C18
TB3	12A	1	C	18	9			J30	12	68C18
TB3	12A	1	C	18	9			P7	25	68D18
TB3	12B	1	C	18	9			CCL	2 (-)	68B18

Table 1. Control Panel Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
TB3	12B	1	C	18	9			PSU	4	68A18
TB3	14A	1	C	18	9			J37	27	44B18
TB3	14B	1	C	18	9			A1	13	44C18
TB3	14B	1	C	18	9			ESPB	1A	44A18
TB3	15A	2	C	18	9			PSU	1	48A18
TB3	15B	2	C	18	9			SMS	15	48B18
TB3	15B	2	C	18	9			SMS	13	48C18
TB3	16A	2	C	18	9			P51	20	56C18
TB3	16B	2	C	18	9			CCS	5	56B18
TB3	16B	2	C	18	9			BSS	1	56A18
TB3	17A	5	C	18	9			J30	33	33C18
TB3	17B	15	C	18	9			ECS	4	33B18
TB3	17B	15	C	18	9			P7	33	33A18
TB3	19A	1	C	18	9			A2	4	4A18
TB3	19A	1	C	18	9			J30	4	4C18
TB3	19B	1	C	18	9			P7	23	4D18
TB3	21A	2	A	14	9			J30	28	98C14
TB3	21A	1	C	18	9			KFF	5	98E18
TB3	21B	2	A	14	9			A3	F2	98A14
TB3	22A	1	C	18	9			A7	9	99D18
TB3	22A	2	A	14	9			J30	29	99C14
TB3	22B	2	A	14	9			A3	F1	99A14
TB4	1A	1	C	18	9			A6	B21	110F18
TB4	1A	2	A	14	9			J30	17	110M14
TB4	1B				9			CB3	LINE	

Table 1. Control Panel Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
TB4	2A	1	C	18	9			A5	H21	110G18
TB4	2A	1	C	18	9			P51	16	110H18
TB4	3A	1	B	16	9			J31	10	110C16
TB4	5A	2	A	14	9			J30	16	109F14
TB4	5A	1	C	18	9			P51	15	109G18
TB4	5B				1			CB3	LINE	
TB4	6A	1	C	18	9			A4	3	109H18
TB4	6A	2	B	16	9			J30	10	109C16
TB4	6B	2	B	16	9			A3	20	109D16
TB4	7A	1	C	18	9			A4	2	108E18
TB4	7A	2	B	16	9			J30	34	108C16
TB4	7B	2	B	16	9			A3	24	108D16
TB4	8A	1	C	18	9			A4	1	107E18
TB4	8A	2	B	16	9			J30	37	107C16
TB4	8B	2	B	16	9			A3	22	107D16
TB4	10A	1	C	18	9			J30	14	76B18
TB4	10B	1	C	18	9			HTR1	1	76C18
TB4	11A	2	B	16	9			A1	26	54A16
TB4	11B	2	C	18	9			CDR	4	54D18
TB4	11B	2	B	16	9			KR	12	54B16
TB4	12B	2	C	18	9			TS	2	87WP18
TB4	13A	2	C	18	9			SMS	14	63A18
TB4	14A	2	B	16	9			J31	11	114D16
TB4	14A	2	B	16	9			P51	13	114G16
TB4	14B	2	B	16	9			P51	3	114E16

Table 1. Control Panel Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
TB4	14B	2	B	16	9			P51	11	114F16
TB4	15A	2	C	18	9			J30	19	49C18
TB4	15B	2	C	18	9			CCS 4	4	49A18
TB4	15B	2	C	18	9			CCS	2	49B18
TB4	16A	1	C	18	9			ECS	8	41A18
TB4	16A	1	C	18	9			ECS	9	41B18
TB4	16B	1	C	18	9			AR	1	41D18
TB4	16B	1	C	18	9			ECS	10	41C18
TB4	17A	2	B	16	9			J30	18	21M16
TB4	17A	2	B	16	9			J37	40	21N16
TB4	17B	1	C	18	9			TS	1	27WA18
TB4	18A	1	C	18	9			A3	B+	21L18
TB4	18B	1	C	18	9			AFPS	2	21K18
TB4	19A	2	A	14	9			A4	15	21C14
TB4	19A	2	B	16	9			J30	8	21B16
TB4	19B	2	A	14	9			A1	39	21A14
TB4	19B	1	C	18	9			A2	1	21H18
TB4	20A	1	C	18	9			AFPR	5	21E18
TB4	20A	1	C	18	9			AR	14	21F18
TB4	20B	1	C	18	9			FLG	I	21D18
TB4	21A	1	C	18	9			A1	38	27F18
TB4	21A	2	B	16	9			J30	13	27J16
TB4	21B	1	C	18	9			ECS	6	27H18
TB4	21B	1	C	18	9			PLS	1	27G18
TB4	22A	2	A	14	9			A7	12	27B14

Table 1. Control Panel Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
TB4	22A	1	C	18	9			PAR	14	27E18
TB4	22B	2	A	14	9			A1	(B+)	27C14
TB4	22B	1	C	18	9			CCL	1 (+)	27D18
VAR	1	17	E	18	9		SH5	A3	45	505
VAR	3	17	E	18	2		SH5	A3	7	505

Table 2. Generator Set Harness (Generator, Engine, Control Panel) Wire List.

NOTES

Color Code

0 Black	5 Green
1 Brown	6 Blue
2 Red	7 Violet
3 Orange	8 Gray
4 Yellow	9 White

Abbreviations used in table can be found in FO-1 at the back of this manual or in List of Abbreviations/Acronyms (WP 0001).

The list below describes End Prep in Table 2:

Code	Part Number	Nomenclature
1	88-21944	Socket (18-16 AWG)
2	88-20274-1	Terminal, Spade 20 AWG, #6
3	88-20477	Contact, Electrical, Female
4	88-20274-3	Terminal, Spade 20 AWG, #8
5	88-20274-10	Terminal, Spade 12 AWG, #6
6	MS25036-158	Terminal Lug, Ring Tongue, 10 AWG
7	88-20274-5	Terminal, Spade 16 AWG, #6
8	401256-001	Terminal Lug, Push-on
9	0116-1215	Adapter, Terminal Disconnect
10	88-22119-19	Terminal Lug, Ring Tongue, 10-12 AWG
11	401256-002	Terminal Lug, Push-on
12	88-22119-21	Terminal Lug, Ring Tongue, 4AWG
13	MS25036-125	Terminal Lug, Ring Tongue, 4 AWG
14	0116-1224	Socket, Connector (18 - 14 AWG)
15	88-20274-9	Terminal, Spade 12 AWG, #8
16	88-20274-7	Terminal, Spade 12 AWG, #10
17	-	Solder to terminal
18	88-20274-11	Terminal, Spade 16 AWG, #8
19	88-22119-17	Terminal Lug, Ring Tongue
20	88-22119-18	Terminal Lug, Ring Tongue
21	MS25036-155	Terminal Lug, Ring Tongue, 16 AWG
22	MS25036-151	Terminal Lug, Ring Tongue, 20 AWG
23	0116-1232-02	Terminal, Pin, 16-14 AWG
24	88-22119-13	Terminal Lug, Ring Tongue
25	MS25036-105	Terminal Lug, Ring Tongue, 20 AWG

The list below describes Wire Type column in Table 2:

Wire Code	Nomenclature	Part Number
A	Wire, Electric, Extruded ETFE 14 Ga	M22759/16-14-9
B	Wire, Electric, Extruded ETFE 16 Ga	M22759/16-16-9
C	Wire, Electric, Extruded ETFE 18 Ga	M22759/16-18-9
D	Wire, Electric, Extruded ETFE 10 Ga	M22759/16-18-9
E	Wire, Electrical, 4 AWG	88-20540-10

Table 2. Generator Set Harness (Generator, Engine, Control Panel) Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
AFP	CASE	-	C	18	9			AFPV	2	2BH18
AFP	1	-			0			AFPV	1	
AFPV	1	1	C	18	9			P30	1	8B18
AFPV	2	1	C	18	9			AFP	CASE	2BH18
AFPV	2	3	C	18	9			TB5	17B	2BG18
ALT	(-)	10	D	10	9			SM	(-)	2BE10
ALT	(+)	6	D	10	9			CB5	2	28A10
BDS	1	-	-	-	0			BT2	(-)	1A410
BDS	2	-	-	-	0			SM	(-)	2A410
BT1	(-)	-	-	-	0			BT2	(+)	12A410
BT1	(+)	-	-	-	0			PS	(+)	24A410
BT1	(+)	-	-	-	0			SR	(+)	24D410
BT2	(-)	-	-	-	0			BDS	1	1A410
BT2	(-)	-	-	-	0			SR	(-)	1C410
BT2	(+)	-	-	-	0			BT1	(-)	12A410
BDS Field	A	8	C	16	9			TB5	5A	22B16
BDS Field	B		B	16	9			TB5	6A	91A16
CATSW1	2	2	C	18	9			TB5	21A	2BJ18
CATSW2	2	2	C	18	9			TB5	21A	2BK18

Table 2. Generator Set Harness (Generator, Engine, Control Panel) Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
CB	GND	10	D	10	9			SM	(-)	2D10
CB2	1	15	D	10	9			PS	(+)	24C10
CB2	2	11	D	10	9			SMMS	1	75A10
CB4	1	18	A	14	9			R4	4	25E14
CB4	2	18	A	14	9			SRY	30	74A14
CB5	1	16	D	10	9			R4	4	25A10
CB5	2	18	D	10	9			ALT	(+)	28A10
CCCT	X1	11	B	16	9			P30	36	115C16
CCCT	X2	11	B	16	9			P30	35	116C16
CT1	X1	11	B	16	9			P31	4	151A16
CT1	X2	11	B	16	9			CT2	X2	150C16
CT1	X2	11	B	16	9			P31	14	150A16
CT2	X1	11	B	16	9			P31	9	152A16
CT2	X2	11	B	16	9			CT1	X2	150C16
CT2	X2	11	B	16	9			CT3	X2	150D16
CT3	X1	11	B	16	9			P31	13	153A16
CT3	X2	11	B	16	9			CT2	X2	150D16
CT7	X1	11	B	16	9			P31	16	111A16
CT7	X2	11	B	16	9			CT8	X2	114C16
CT8	X1	11	B	16	9			P31	15	112A16
CT8	X2	11	B	16	9			CT7	X2	114C16
CT8	X2	11	B	16	9			CT9	X2	114B16
CT9	X1	11	B	16	9			P31	18	113A16

Table 2. Generator Set Harness (Generator, Engine, Control Panel) Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
CT9	X2	11	B	16	9			CT8	X2	114B16
CT9	X2	11	B	16	9			P31	11	114A16
D1	Anode	17	D	10	9			R4	4	25B10
D1	Cathode	21	A	14	9			DCS	2	26A14
DCS	1	2	C	18	9			TB5	5A	22A18
DCS	2	7	A	14	9			D1	Cathode	26A14
DCS	3	7	A	14	9			P30	9	17A14
F1	1	23	B	16	9			TB5	7A	107F16
F1	2	23	B	16	9			PT3	IN-115	124A16
F2	1	23	B	16	9			TB5	8A	108F16
F2	2	23	B	16	9			PT2	IN-0	125A16
F3	1	23	B	16	9			TB5	9A	109J16
F3	2	23	B	16	9			PT2	IN-115	126A16
FLSU	1	15	C	18	9			P30	7	80A18
FLSU	G	4	C	18	9			TB5	20A	2AZ18
Frame	Gnd	13	E	4	9			TB2	GND	2F4
GEN	GND	13	E	4	9			TB2	GND	2E4
K1	A1	-	-	-	0			TB1	1	101A410
K1	A2	25	C	18	9			P31	19	121C1 8
K1	B1	-	-	-	0			TB1	2	102A410
K1	B2	25	C	18	9			P31	8	122C18
K1	C1	-	-	-	0			TB1	3	103A410
K1	C2	27	C	18	9			P31	17	123C18

Table 2. Generator Set Harness (Generator, Engine, Control Panel) Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
K1	X1	7	B	16	9			P30	23	50B16
K1	X2	7	B	16	9			TB5	19B	2BR16
K1	21	7	B	16	9			TB5	20B	2BB16
K1	22	2	C	18	9			P30	12	68E18
K1	41	7	B	16	9			TB5	20B	2BC16
K1	42	2	C	18	9			P30	19	49D18
P11	1	3	C	18	9			P30	4	4B18
P11	2	3	C	18	9			TB5	19A	2AY18
P12	1	3	C	18	9			P30	1	8B18
P30	1	1	C	18	9			AFPV	1	8B18
P30	2	1	C	18	9			P8	2	10B18
P30	3	1	C	18	9			P8	3	11C18
P30	4	1	C	18	9			P11	1	4B18
P30	5	1	C	18	9			P8	1	69B18
P30	7	1	C	18	9			FLSU-S	1	80A18
P30	8	1	B	16	9			TB5	12B	21P16
P30	9	14	A	14	9			DCS	3	17A14
P30	10	1	B	16	9			TB1	9	109B16
P30	12	1	C	18	9			K1	22	68E18
P30	13	1	B	16	9			TB5	16B	27K16
P30	14	1	C	18	9			TB5	15B	76A18
P30	15	1	C	18	9			TB5	4B	60B18
P30	16	14	A	14	9			TB1	9	109E14
P30	17	14	A	14	9			TB1	13	110N14
P30	18	1	B	16	9			TB5	11B	21R16

Table 2. Generator Set Harness (Generator, Engine, Control Panel) Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
P30	19	1	C	18	9			K1	42	49D18
P30	20	1	B	16	9			TB5	20A	2AU16
P30	23	1	B	16	9			K1	X1	50B16
P30	24	1	C	18	9			R4	2	24F18
P30	25	1	C	18	9			R4	3	25C18
P30	28	14	A	14	9			TB5	1B	98B14
P30	29	14	A	14	9			TB5	2B	99B14
P30	33	1	C	18	9			TB5	22A	33D18
P30	34	1	B	16	9			TB5	8B	108B16
P30	35	1	B	16	9			CCCT	X2	116C16
P30	36	1	B	16	9			CCCT	X1	115C16
P30	37	1	B	16	9			TB5	7B	107B16
P31	1	1	C	18	9			TB1	1	101C18
P31	3	1	C	18	9			TB1	2	102C18
P31	4	1	B	16	9			CT1	X1	151A16
P31	5	14	A	14	9			PT2	OP-115	134B14
P31	6	14	A	14	9			PT3	OP-0	135B14
P31	7	14	A	14	9			PT3	OP-115	136B14
P31	8	1	C	18	9			K1	B2	122C18
P31	9	1	B	16	9			CT2	X1	152A16
P31	10	1	B	16	9			TB5	10A	110B16
P31	11	1	B	16	9			CT9	X2	114A16
P31	12	1	C	18	9			TB1	3	103C18

Table 2. Generator Set Harness (Generator, Engine, Control Panel) Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
P31	13	1	B	16	9			CT3	X1	153A16
P31	14	1	B	16	9			CT1	X2	150A16
P31	15	1	B	16	9			CT8	X1	112A16
P31	16	1	B	16	9			CT7	X1	111A16
P31	17	1	C	18	9			K1	C2	123C18
P31	18	1	B	16	9			CT9	X1	113A16
P31	19	1	C	18	9			K1	A2	121C18
P8	1	3	C	18	9			P30	5	69B18
P8	2	3	C	18	9			P30	2	10B18
P8	3	3	C	18	9			P30	3	11C18
PS	(+)	6	D	10	9			CB2	1	24C10
PS	(+)	6	D	10	9			R4	1	24E10
PS	Coil (+)	16	D	10	9			SMMS	2	23A10
PT2	ESS	11	B	16	9			PT3	ESS	2BS16
PT2	IN-0	11 & 9	B	16	9			F2	2	125A16
PT2	IN-0	23	B	16	9			PT2	IN-115	Jumper
PT2	IN-0	23	B	16	9			PT3	IN-0	125B16
PT2	IN-115	11	B	16	9			F3	2	126A16
PT2	IN-115	23	B	16	9			PT2	IN-0	Jumper
PT2	OP-0	23	A	14	9			PT2	OP-0	135E14
PT2	OP-0	23	A	14	9			PT2	OP-0	135E14
PT2	OP-0	11 & 9	A	14	9			PT3	OP-0	135D14

Table 2. Generator Set Harness (Generator, Engine, Control Panel) Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
PT2	OP-115	23	A	14	9			PT2	OP-115	134C14
PT2	OP-115	23	A	14	9			PT2	OP-115	134C14
PT2	OP-115	11	A	14	9			P31	5	134B14
PT2	OP-ESS	23	B	16	9			PT2	OP-GND	Jumper
PT2	OP-GND	18	B	16	9			PT2	OP-ESS	Jumper
PT3	ESS	11	B	16	9			PT2	ESS	2BS16
PT3	GND	11	B	16	9			TB5	18B	2BT16
PT3	IN-0	23	B	16	9			PT3	IN-115	Jumper
PT3	IN-0	23	B	16	9			PT2	IN-0	125B16
PT3	IN-115	11	B	16	9			F1	2	124A16
PT3	IN-115	23	B	16	9			PT3	IN-0	Jumper
PT3	OP-ESS	23	B	16	9			PT3	OP-GND	Jumper
PT3	OP-GND	18	B	16	9			PT3	OP-ESS	Jumper
PT3	OP-0	11	A	14	9			PT2	OP-0	135D14
PT3	OP-0	23	A	14	9			PT3	OP-0	135C14
PT3	OP-0	23	A	14	9			PT3	OP-0	135C14
PT3	OP-0	11	A	14	9			P31	6	135B14
PT3	OP-115	23	A	14	9			PT3	OP-115	136C14
PT3	OP-115	23	A	14	9			PT3	OP-115	136C14
PT3	OP-115	11	A	14	9			P31	7	136B14
R4	1	10	D	10	9			PS	(+)	24E10
R4	2	4	C	18	9			P30	24	24F18
R4	3	5	C	18	9			P30	25	25C18

Table 2. Generator Set Harness (Generator, Engine, Control Panel) Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
R4	4	20	A	14	9			CB4	1	25E14
R4	4	10	D	10	9			CB5	1	25A10
R4	4	10	D	10	9			D1	Anode	25B10
SM	(-)				0			BDS	2	2A410
SM	(-)	6	D	10	9			ALT	GND	2BE10
SM	(-)				0			TB2	GND	2C410
SM	(-)	6	D	10	9			CB	GND	2D10
SM	(-)	6	D	10	9			TB5	19B	2BA10
SMMS	1	15	D	10	9			CB2	2	75A10
SMMS	2	15	D	10	9			PS	Coil (+)	23A10
SMMS	3	7	B	16	9			TB5	6A	91B16
SMMS	4	8	C	18	9			TB5	18A	2BD18
SRY	30	11	A	14	9			CB4	2	74A14
SRY	85	8 & 9	C	18	9			TB5	12A	21S18
SRY	86	8 & 9	C	18	9			TB5	18B	2BF18
TB1	1			4	0			K1	A1	101A410
TB1	1	22	C	18	9			P31	1	101C18
TB1	2			4	0			K1	B1	102A410
TB1	2	22	C	18	9			P31	3	102C18
TB1	3			4	0			K1	C1	103A410
TB1	3	22	C	18	9			P31	12	103C18
TB1	7	21	B	16	9			TB5	7B	107A16
TB1	8	21	B	16	9			TB5	8B	108A16

Table 2. Generator Set Harness (Generator, Engine, Control Panel) Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
TB1	9	21	B	16	9			TB5	9B	109A16
TB1	9	21	B	16	9			P30	10	109B16
TB1	9	21	A	14	9			P30	16	109E14
TB1	9	21	A	14	9			P30	16	109E14
TB1	10			4				TB2	N	110K410
TB1	12							TB2	N	110K410
TB1	13	21	B	16	9			TB5	10B	110A16
TB2	GND	5	E	4	9			Frame	Gnd	2F4
TB2	GND	12	E	14	9			GEN	GND	2E4
TB2	GND							SM	(-)	2C410
TB2	L1	24	B	16	9			V1	1	121E16
TB2	L1							K1	A2	121A410
TB2	L1							K1	A2	121B410
TB2	L2	24	B	16	9			V2	1	122F16
TB2	L2							K1	B2	122A410
TB2	L2							K1	B2	122B410
TB2	L3	24	B	16	9			V3	1	123H16
TB2	L3							K1	C2	123A410
TB2	L3							K1	C2	123B410
TB2	N	24	B	16	9			V4	1	110J16
TB2	N			4	0			TB1	10	110K410
TB2	N			4	0			TB1	12	110L410
TB5	1A	7	A	14	9			G1	F2	
TB5	1B	7	A	14	9			P30	28	98B14
TB5	2A	7	A	14	9			G1	F1	

Table 2. Generator Set Harness (Generator, Engine, Control Panel) Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
TB5	2B	7	A	14	9			P30	29	99B14
TB5	4	2	C	18	9			P30	15	60B18
TB5	5A	2	C	18	9			DCS	1	22A18
TB5	5A	2	C	18	9			BDS Field	A	22B16
TB5	6A	7	B	16	2			SMMS	3	91A16
TB5	6A	8	B	16	2			BDS FIELD	B	91B16
TB5	7A	7	B	16	9			F1	1	107F16
TB5	7B	7	B	16	9			P30	37	107B16
TB5	7B	7	B	16	9			TB1	7	107A16
TB5	8A	7	B	16	9			F2	1	108F16
TB5	8B	7	B	16	9			P30	34	108B16
TB5	8B	7	B	16	9			TB1	8	108A16
TB5	9A	7	B	16	9			F3	1	109J16
TB5	9B	7	B	16	9			TB1	9	109A16
TB5	10A	7	B	16	9			P31	10	110B16
TB5	10B	7	B	16	9			TB1	13	110A16
TB5	11B	7	B	16	9			P30	18	21R16
TB5	12A	2	C	18	9			SRY	85	21S18
TB5	12B	7	B	16	9			P30	8	21P16
TB5	15A	2	C	18	9			P26	B	76WA18
TB5	15B	2	C	18	9			P30	14	76A18
TB5	16A	2	C	18	9			P26	E	27WA14
TB5	16B	7	B	16	9			P30	13	27K16
TB5	17A	2	C	18	9			P26	A	2WB14

Table 2. Generator Set Harness (Generator, Engine, Control Panel) Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
TB5	17B	2	C	18	9			P12	2	2BG18
TB5	18A	2	C	18	9			SMMS	4	2BD18
TB5	18B	7	B	16	9			PT3	GND	2BT16
TB5	18B	2	C	18	9			SRY	86	2BF18
TB5	19A	2	C	18	9			P11	2	2AY18
TB5	19B	7	B	16	9			K1	X2	2BR16
TB5	19B	5	D	10	9			SM	(-)	2BA10
TB5	20	2	C	18	9			FLSU	G	2AZ18
TB5	20A	2	B	16	9			P30	20	2AU16
TB5	20B	7	B	16	9			K1	21	2BB16
TB5	20B	7	B	16	9			K1	41	2BC16
TB5	21A	2	C	18	9			CATSW1	2	2BJ18
TB5	21A	2	C	18	9			CATSW2	2	2BK18
TB5	22A	2	C	18	9			P30	33	33D18
V1	1	3	B	16	9			TB2	L1	121E16
V2	1	3	B	16	9			TB2	L2	122F16
V3	1	3	B	16	9			TB2	L3	123H16
V4	1	3	B	16	9			TB2	N	110J16

Table 3. ECM to EMCP Harness Wire List.

NOTES

Color Code

0 Black	5 Green
1 Brown	6 Blue
2 Red	7 Violet
3 Orange	8 Gray
4 Yellow	9 White

Abbreviations used in table can be found in FO-1 at the back of this manual or in List of Abbreviations/Acronyms (WP 0001).

The list below describes End Prep in Table 3:

Code	Part Number	Nomenclature
1	9X-3402	Socket
2	9X-0141	Plug Assy
3	9W-0852	Pin
4	126-1768	Socket
5	8T-8730	Socket
6	8T-8729	Pin

The list below describes Wire Type in Table 3:

Wire Code	Nomenclature	Part Number
A	Wire, 16 GA T (twisted pair)	6A-3770
B	Wire, 14 GA T (twisted pair)	5P-4704
C	Wire, 16 GA GN/YEL	6V-8241
D	Wire, 18 GA BK	5P-3075
E	Wire, 18 GA WH	6V-2648

The list below describes the ECM J1 to EMCP Harness Connectors

Connector	Description
CDC-P7	Plug, Cat Diagnostic Computer Connector
ENG-P1	Plug, ECM Connector J1
ENG-P8	Plug, Turbo Inlet Pressure Sensor
ENG-P14	Plug, Magnetic Speed Pickup (MPU) Connector
ENG-P16	Plug, Low Coolant Sensor Connector
ENG-P20	Plug, Filtered Fuel Pressure Sensor
ENG-P37	Plug, EMCP Connector
ENG-P213	Plug, Ether Injection Relay

Table 3. ECM to EMCP Harness Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
BATT	(-)	7	C	16	54			Splice 3	2	
CATSW 1	1	7	D	18	0			ENG-P1	6	
CATSW 2	1	7	D	18	0			ENG-P1	60	
ENG-P1	1	1	D	18	0			ENG-P7	J	
ENG-P1	2	1	A	16	T			Splice 1	1	
ENG-P1	3	1	A	16	T			Splice 2	1	
ENG-P1	5	1	E	18	9			ENG-P37	11	
ENG-P1	6	1	D	18	0			CATSW 1	1	
ENG-P1	8	1	D	18	0			CDC-P7	D	
ENG-P1	9	1	E	18	9			CDC-P7	E	
ENG-P1	14	1	E	18	9			CDC-P7	H	
ENG-P1	16	1	A	16	T			ENG-P20	C	
ENG-P1	17	1	A	16	T			ENG-P8	C	
ENG-P1	21	1	A	16	T			ENG-P213	1	
ENG-P1	23	1	A	16	T			ENG-P37	27	
ENG-P1	34	1	E	18	9			CDC-P7	G	
ENG-P1	40	1	A	16	T			ENG-P37	26	
ENG-P1	42	1	D	18	0			CDC-P7	C	Shield
ENG-P1	48	4	B	14	T			Splice 4	1	
ENG-P1	50	1	D	18	0			CDC-P7	F	

Table 3. ECM to EMCP Harness Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
ENG-P1	52	4	B	14	T			Splice 4	1	
ENG-P1	53	4	B	14	T			Splice 4	1	
ENG-P1	58	1	A	16	T			ENG-P37	35	
ENG-P1	60	1	D	18	0			CATSW 2	1	
ENG-P1	61	1	C	16	54			Splice 3	1	
ENG-P1	63	1	C	16	54			Splice 3	1	
ENG-P1	65	1	C	54	T			Splice 3	1	
ENG-P1	66	1	D	18	0			ENG-P37	23	
ENG-P1	70	1	A	16	T			ENG-P37	40	
ENG-P1	-	-	D	18	0			ENG-P37	12	Shield
CDC-P7	A	3	B	14	T			Splice 4	2	
CDC-P7	B	3	C	16	54			Splice 3	2	
CDC-P7	C	6	D	18	0			ENG-P1	42	Shield
CDC-P7	D	3	D	18	0			ENG-P1	8	
CDC-P7	D	3	D	18	0			ENG-P37	19	
CDC-P7	E	3	E	18	9			ENG-P1	9	
CDC-P7	E	3	E	18	9			ENG-P37	20	
CDC-P7	F	6	D	18	0			ENG-P1	50	
CDC-P7	G	6	E	18	9			ENG-P1	34	
CDC-P7	H	6	E	18	9			ENG-P1	14	

Table 3. ECM to EMCP Harness Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
CDC-P7	J	6	D	18	0			ENG-P1	1	
CDC-P7			D	18	0			ENG-P37	18	Shield
ENG-P8	A	6	A	16	T			Splice 2	2	
ENG-P8	B	6	A	16	T			Splice 1	2	
ENG-P8	C	6	A	16	T			ENG-P1	17	
ENG-P14	1	5	D	18	0			ENG-P37	1	
ENG-P14	2	5	E	18	9			ENG-P37	2	
ENG-P14			D	18	0			ENG-P37	3	Shield
ENG-P16	A	5	A	16	T			ENG-P37	9	
ENG-P16	B	5	A	16	T			ENG-P37	31	
ENG-P16	C	5	A	16	T			ENG-P37	13	
ENG-P20	A	6	A	16	T			Splice 2	2	
ENG-P20	B	6	A	16	T			Splice 1	2	
ENG-P20	C	6	A	16	T			ENG-P1	16	
ENG-P37	1	5	D	18	0			ENG-P14	1	
ENG-P37	2	5	E	18	9			ENG-P14	2	
ENG-P37	3	5	D	18	0			ENG-P14		Shield
ENG-P37	9	1	A	16	T			ENG-P16	A	

Table 3. ECM to EMCP Harness Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
ENG-P37	11	5	E	18	9			ENG-P1	5	
ENG-P37	12	5	D	18	0			ENG-P1		Shield
ENG-P37	13	1	A	16	T			ENG-P16	C	
ENG-P37	18	5	D	18	0			CDC-P7		Shield
ENG-P37	19			18				CDC-P7		
ENG-P37	20	5	E	18	9			CDC-P7	E	
ENG-P37	23	5	D	18	0			ENG-P1	66	
ENG-P37	26	2	A	16	T			ENG-P1	40	
ENG-P37	27	2	A	16	T			ENG-P1	23	
ENG-P37	31	1	A	16	T			ENG-P16	B	
ENG-P37	35	1	A	16	T			ENG-P1	58	
ENG-P37	40	1	A	16	T			ENG-P1	70	
ENG-P213	1	5	A	16	T			ENG-P1	21	
ENG-P213	2	5	C	16	54			Splice 3	2	
Splice 1	1		A	16	T			ENG-P1	2	
Splice 1	2		A	16	T			ENG-P1	B	
Splice 1	2		A	16	T			ENG-P20	B	
Splice 2	1		A	16	T			ENG-P1	3	
Splice 2	2		A	16	T			ENG-P15	A	
Splice 2	2		A	16	T			ENG-P20	A	
Splice 3	1		C	16	54			ENG-P1	61	

Table 3. ECM to EMCP Harness Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
Splice 3	1		C	16	54			ENG-P1	63	
Splice 3	1		C	16	54			ENG-P1	65	
Splice 3	2		C	16	54			BATT	(-)	
Splice 3	2		C	16	54			CDC-P7	B	
Splice 3	2		C	16	54			ENG-P13	2	
Splice 4	1		B	14	T			ENG-P1	48	
Splice 4	1		B	14	T			ENG-P1	52	
Splice 4	1		B	14	T			ENG-P1	53	
Splice 4	2		B	14	T			CDC-P7	A	
Splice 4	2		B	14	T			SRY	87	
SRY	87	7	B	14	T			Splice 4	2	

Table 4. Engine Harness Wire List.

NOTES

Color Code

0 Black	5 Green
1 Brown	6 Blue
2 Red	7 Violet
3 Orange	8 Gray
4 Yellow	9 White

Abbreviations used in table can be found in FO-1 at the back of this manual or in List of Abbreviations/Acronyms (WP 0001).

The list below describes End Prep in Table 4:

Code	Part Number	Nomenclature
1	180-9340	Socket
2	180-9339	Pin
3	TBD	Splice

The list below describes Wire Type in Table 4:

Wire Code	Nomenclature	Part Number
A	Wire, 18 GA OR	130-4674
B	Wire, 18 GA YL	130-4673
C	Wire, 18 GA GN	130-4676
D	Wire, 18 GA WH	130-4669
E	Wire, 18 GA BU	130-4670
F	Wire, 18 GA PU	130-4671
G	Wire, 18 GA GY	5P-3074
H	Wire, 18 GA BK	5P-3075
I	Wire, 18 GA GY	130-4672
J	Wire, 18 GA BR	130-4675
K	Wire, 18 GA BR	5P-9072
L	Wie, 18 GA BU	5P-9082
M	Wire, 18 GA PK	5P-9076
N	Wire, 18 GA GN	5P-9080
O	Wire, 18 GA WH	6V-2648
P	Wire, 18 GA YL	5P-9074

Table 4. Engine Harness Wire List - Continued.

The list below describes ECM J2 Engine Harness Connectors

Connector	Description
ENG-P2	Plug, ECM Connector J2
ENG-P100	Plug, Coolant Temperature Sensor
ENG-P103	Plug, Intake Manifold Air Temperature Sensor
ENG-P105	Plug, Fuel Temperature Sensor
ENG-P200	Plug, Turbo Outlet Pressure Sensor
ENG-P201	Plug, Oil Pressure Sensor
ENG-P202	Plug, Fuel Pressure Sensor
ENG-P203	Plug, Atmospheric Pressure Sensor
ENG-P300	Plug, Fuel Injector Harness Connector
ENG-P400	Plug, TDC Probe Connector (Timing Calibration)
ENG-P401	Plug, Bottom Crankshaft Timing Sensor
ENG-P402	Plug, Top Camshaft Timing Sensor

Table 4. Engine Harness Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
ENG-P100	1	1	L	18	6			ENG-P2	32	
ENG-P100	2	1	M	18	PK			Splice 3	2	
ENG-P101	1	1	L	18	6			ENG-P2	12	
ENG-P101	2	1	H	18	0			Splice 4	2	
ENG-P103	1	1	L	18	6			ENG-P2	35	
ENG-P103	2	1	M	18	PK			Splice 3	2	
ENG-P105	1	1	P	18	4			ENG-P2	33	
ENG-P105	2	1	M	18	PK			Splice 3	2	
ENG-P2	2	1	O	18	9			Splice 1	1	
ENG-P2	3	1	N	18	5			Splice 2	1	
ENG-P2	9	1	H	18	0			Splice 4	1	
ENG-P2	10	1	K	18	1			ENG-P300	11	
ENG-P2	11	1	N	18	5			ENG-P300	9	
ENG-P2	12	1	L	18	6			ENG-P101	1	
ENG-P2	14	1	G	18	8			ENG-P203	C	
ENG-P2	16	1	M	18	PK			ENG-P202	C	
ENG-P2	18	1	M	18	PK			Splice 3	1	
ENG-P2	22	1	O	18	9	TW3		ENG-P400	1	
ENG-P2	23	1	P	18	4	TW3		ENG-P400	2	
ENG-P2	24	1	G	18	8			ENG-P201	C	
ENG-P2	32	1	L	18	6			ENG-P100	1	
ENG-P2	33	1	P	18	4			ENG-P105	1	
ENG-P2	35	1	L	18	6			ENG-P103	1	
ENG-P2	36	1	I	18	8			ENG-P300	1	
ENG-P2	37	1	F	18	7			ENG-P300	2	

Table 4. Engine Harness Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
ENG-P2	38	1	J	18	1			ENG-P300	3	
ENG-P2	39	1	C	18	5			ENG-P300	4	
ENG-P2	40	1	M	18	PK			ENG-J200	C	
ENG-P2	44	1	D	18	9			ENG-P300	12	
ENG-P2	45	1	A	18	3			ENG-P300	10	
ENG-P2	46	1	B	18	4			ENG-P300	8	
ENG-P2	48	1	O	18	9	TW1		ENG-P401	2	
ENG-P2	49	1	H	18	0	TW1		ENG-P401	1	
ENG-P2	54	1	E	18	6			ENG-P300	5	
ENG-P2	55	1	I	18	8			ENG-P300	6	
ENG-P2	58	1	P	18	4	TW2		ENG-P402	2	
ENG-P2	59	1	L	18	6	TW2		ENG-P402	1	
ENG-P200	A	2	O	18	9			Splice 1	2	
ENG-P200	B	2	N	18	5			Splice 2	2	
ENG-P200	C	2	M	18	PK			ENG-P2	40	
ENG-P201	A	2	O	18	9			Splice 1	1	
ENG-P201	B	2	N	18	5			Splice 2	1	
ENG-P201	C	2	G	18	8			ENG-P2	24	
ENG-P202	A	2	O	18	9			Splice 1	2	
ENG-P202	B	2	N	18	5			Splice 2	2	
ENG-P202	C	2	M	18	PK			ENG-P2	16	
ENG-P203	A	2	O	18	9			Splice 1	2	
ENG-P203	B	2	N	18	5			Splice 2	2	
ENG-P203	C	2	G	18	8			ENG-P2	14	
ENG-P2	37	1	F	18	7			ENG-P300	2	

Table 4. Engine Harness Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
ENG-P300	1	1	I	18	8			ENG-P2	36	
ENG-P300	2	1	F	18	7			ENG-P2	37	
ENG-P300	3	1	J	18	1			ENG-P2	38	
ENG-P300	4	1	C	18	5			ENG-P2	39	
ENG-P300	5	1	E	18	6			ENG-P2	54	
ENG-P300	6	1	I	18	8			ENG-P2	55	
ENG-P300	7	1	H	18	0			Splice 4	2	
ENG-P300	8	1	B	18	4			ENG-P2	46	
ENG-P300	9	1	N	18	5			ENG-P2	11	
ENG-P300	10	1	A	18	3			ENG-P2	45	
ENG-P300	11	1	K	18	1			ENG-P2	10	
ENG-P300	12	1	D	18	9			ENG-P2	44	
ENG-P400	1	1	O	18	9	TW3		ENG-P2	22	
ENG-P400	2	1	P	18	4	TW3		ENG-P2	23	
ENG-P401	1	1	H	18	0	TW1		ENG-P2	49	
ENG-P401	2	1	O	18	9	TW1		ENG-P2	48	
ENG-P402	1	1	L	18	6	TW2		ENG-P2	59	
ENG-P402	2	1	P	18	4	TW2		ENG-P2	58	
Splice 1	1	3	O	18	9			ENG-P201	A	
Splice 1	1	3	O	18	9			ENG-P2	2	

Table 4. Engine Harness Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
Splice 1	2	3	O	18	9			ENG-P200	A	
Splice 1	2	3	O	18	9			ENG-P202	A	
Splice 1	2	3	O	18	9			ENG-P203	A	
Splice 2	1	3	N	18	5			ENG-P201	B	
Splice 2	1	3	N	18	5			ENG-P2	3	
Splice 2	2	3	N	18	5			ENG-P200	B	
Splice 2	2	3	N	18	5			ENG-P202	B	
Splice 2	2	3	N	18	5			ENG-P203	B	
Splice 3	1	3	M	18	PK			ENG-P2	18	
Splice 3	2	3	M	18	PK			ENG-P100	2	
Splice 3	2	3	M	18	PK			ENG-P103	2	
Splice 3	2	3	M	18	PK			ENG-P105	2	
Splice 4	1	3	H	18	0			ENG-P2	9	
Splice 4	2	3	H	18	0			ENG-P101	2	
Splice 4	2	3	H	18	0			ENG-P300	7	

Table 5. Engine Harness to Unit Injectors Wire List.

NOTES

Color Code

0 Black	5 Green
1 Brown	6 Blue
2 Red	7 Violet
3 Orange	8 Gray
4 Yellow	9 White

Abbreviations used in table can be found in FO-1 at the back of this manual or in List of Abbreviations/Acronyms (WP 0001).

The list below describes End Prep in Table 5:

Code	Part Number	Nomenclature
1	8T-8729	Pin
2	7E-6513	Connector Assembly
3	066-8391	Terminal
4		Splice

The list below describes Wire Type in Table 5:

Wire Code	Nomenclature	Part Number
A	Wire 16 Ga YL	3E-9467
B	Wire 16 Ga GY	3E-9470
C	Wire 16 Ga PU	3E-9475
D	Wire 16 Ga BR	3E-9472
E	Wire 16 Ga GN	3E-9469
F	Wire 16 Ga BU	3E-9471
G	Wire 16 Ga BK	3E-9476
H	Wire 16 Ga WH	3E-9474
I	Wire 16 Ga OR	3E-9468

Table 5. Engine Harness to Unit Injectors Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
Splice 2	1	4	G	16	BK			ENG-J300	7	Not Used
Splice 2	2	4	G	16	BK			ER1/2	C	Not Used
Splice 2	2	4	G	16	BK			ER3/4	C	Not Used
Splice 2	2	4	G	16	BK			ER5/6	C	Not Used
ENG-J300	1		B	16	GY			SOL 1	A701B	
Splice 3	1	4	H	16	WH			ENG-J300	12	
Splice 3	2	4	H	16	WH			SOL 1	D789C	
ENG-J300	2		C	16	PU			SOL 2	A702B	
Splice 3	2	4	H	16	WH			SOL 2	D789D	
ENG-J300	3		D	16	BR			SOL 3	A703B	
Splice 4	1	4	I	16	OR			ENG-J300	10	
Splice 4	2	4	I	16	OR			SOL 3	D790C	
ENG-J300	4		E	16	GN			SOL 4	A704B	
Splice 4	2	4	I	16	OR			SOL 4	D790D	
ENG-J300	5		F	16	BU			SOL 5	A705B	
Splice 5	1	4	A	16	YL			ENG-J300	8	
Splice 5	2	4	A	16	YL			SOL 5	D791 C	
ENG-J300	6		B	16	GY			SOL 6	A706B	
Splice 5	2	4	A	16	YL			SOL 6	D791D	
ENG-J300	9		E	16	GN			ER3/4	+	Not Used
Splice 6	1	4	D	16	BR			ENG-J300	11	Not Used
Splice 6	2	4	D	16	BR			ER1/2	+	Not Used
Splice 6	2	4	D	16	BR			ER5/6	+	Not Used

Table 6. Winterization Control Panel Wire List.

NOTES

Color Code

0 Black	5 Green
1 Brown	6 Blue
2 Red	7 Violet
3 Orange	8 Gray
4 Yellow	9 White

Abbreviations used in table can be found in FO-1 at the back of this manual or in List of Abbreviations/Acronyms (WP 0001).

The list below describes End Prep in Table 6:

Code	Part Number	Nomenclature
1	-	Solder to terminal
2	MS25036-102	Terminal Lug Ring Terminal 22-18 AWG .138 Stud
3	MS25036-153	Terminal Lug Ring Terminal 16-14 AWG .164 Stud
4	MS25036-149	Terminal Lug Ring Terminal 22-18 AWG .164 Stud

The list below describes Wire Type in Table 6:

Wire Code	Nomenclature	Part Number
A	Wire, Electric, Extruded ETFE 14 Ga	M22759/16-14-9
B	Wire, Electric, Extruded ETFE 18 Ga	M22759/16-18-9

Table 6. Winterization Control Panel Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
CB1	1	3	A1	14	9			J26	E	
CB1	2	3	A	14	9			J27	E	
CB1	2	4	B	18	9			S1	4	
CR1	1	2	B	18	9			K20	9	
CR1	3	2	B	18	9			J26	B	
DS1	1	1	B	18	9			K20	13	
DS1	1	1	B	18	9			J26	A	
DS1	2	1	B	18	9			K20	9	
DS1	3	1	B	18	9			S1	1	
DS2	(+)	1	B	18	9			S1	3	
DS2	(-)	1	B	18	9			J27	D	
J26	A	1	B	18	9			DS1	1	
J26	A	1	A	14	9			J27	A	
J26	B	1	B	18	9			CR1	3	
J26	E	1	A	14	9			CB1	1	
J27	A	1	A	14	9			J26	A	
J27	B	1	B	18	9			K20	14	
J27	C	1	B	18	9			S1	3	
J27	D	1	B	18	9			DS2	(-)	
J27	E	1	A	14	9			CB1	2	
K20	9	1	B	18	9			CR1	1	
K20	9	1	B	18	9			DS1	2	
K20	5	1	B	18	9			S1	6	
K20	13	1	B	18	9			DS1	1	
K20	14	1	B	18	9			J27	B	

Table 6. Winterization Control Panel Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
S1	1	2	B	18	9			DS1	3	
S1	1	2	B	18	9			S1	4	
S1	3	2	B	18	9			J27	C	
S1	3	2	B	18	9			DS2	(+)	
S1	4	2	B	18	9			S1	1	
S1	4	2	B	18	9			CB1	2	
S1	6	2	B	18	9			K20	5	

Table 7. Winterization Kit Heater Cable Wire List.

NOTES

Color Code

0 Black	5 Green
1 Brown	6 Blue
2 Red	7 Violet
3 Orange	8 Gray
4 Yellow	9 White

Abbreviations used in table can be found in FO-1 at the back of this manual or in List of Abbreviations/Acronyms (WP 0001).

The list below describes End Prep in Table 7:

Code	Part Number	Nomenclature
1	-	Solder to terminal
2	0116-1811-006	Connector Kit (comes with pins)
3	88-20274-1	Terminal, Spade 22-18 AWG #6

The list below describes Wire Type in Table 7:

Wire Code	Nomenclature	Part Number
A	Wire, Electric, Extruded ETFE 14 Ga	M22759/16-14-9
B	Wire, Electric, Extruded ETFE 18 Ga	M22759/16-18-9

Table 7. Winterization Kit Heater Cable Wire List - Continued.

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
P27	A	1	A	14	9			P28	C3	2WA14
P27	B	1	B	18	9			P27	C	82WB18
P27	C	1	B	18	9			P27	B	82WB18
P27	C	1	B	18	9			P28	A1	82WA18
P27	D	1	B	18	9			P28	B3	83WA18
P27	E	1	A	14	9			P28	C2	27WB14
P28	A1	2	B	18	9			P27	C	82WA18
P28	B3	2	B	18	9			P27	D	83WA18
P28	C2	2	A	14	9			P27	E	27WB14
P28	C3	2	A	14	9			P27	A	2WA14
P28	C4	2	B	18	9			P29	2	84WB18
P29	1	2	B	18	9			TB5	17B	2WC18
P29	2	2	B	18	9			P28	C4	84WB18
TB5	17B	3	B	18	9			P29	1	2WC18

Table 8. Winterization Kit Power Cable Wire List.

NOTES

Color Code

0 Black	5 Green
1 Brown	6 Blue
2 Red	7 Violet
3 Orange	8 Gray
4 Yellow	9 White

Abbreviations used in table can be found in FO-1 at the back of this manual or in List of Abbreviations/Acronyms (WP 0001).

The list below describes End Prep in Table 8:

Code	Part Number	Nomenclature
1	88-20274-5	Terminal, Spade 16-14 AWG #6
2	88-20274-1	Terminal, Spade 22-18 AWG #6
3	-	Solder to terminal

The list below describes Wire Type in Table 8:

Wire Code	Nomenclature	Part Number
A	Wire, Electric, Extruded ETFE 14 Ga	M22759/16-14-9
B	Wire, Electric, Extruded ETFE 18 Ga	M22759/16-18-9

FROM REF DES	PIN	END PREP	WIRE TYPE	GAGE	COLOR	TWISTED WITH	SHIELD	TO REF DES	PIN	NOTES
TB5	15A	2	B	18	9			P26	B	
TB5	16A	1	A	14	9			P26	E	
TB5	17A	1	A	14	9			P26	A	
P26	A	3	A	14	9			TB5	17A	
P26	B	3	B	18	9			TB5	15A	
P26	E	3	A	14	9			TB5	16A	

END OF WORK PACKAGE

CHAPTER 4

UNIT (FIELD) LEVEL
MAINTENANCE INSTRUCTIONS WINTERIZATION KIT

CHAPTER 4

UNIT (FIELD) LEVEL MAINTENANCE INSTRUCTIONS WINTERIZATION KIT

WORK PACKAGE INDEX

Title	WP Sequence No.
WINTERIZATION HEATER CONTROL BOX ASSEMBLY MAINTENANCE	0089
WINTERIZATION HEATER ASSEMBLY MAINTENANCE	0090
WINTERIZATION HEATER HOSES MAINTENANCE	0091
WINTERIZATION THERMOSTAT, RESISTORS, AND DIODE MAINTENANCE	0092
WINTERIZATION WIRING HARNESSES MAINTENANCE	0093

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

WINTERIZATION HEATER CONTROL BOX ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Personnel Required

Two

Materials/Parts

Marker tags (WP 0124, Item 49)
Tiedown straps (WP 0124, Item 47)

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Open left rear doors.

3. Disconnect connector P26 from connector J26 (Figure 1, Item 1) and connector P27 from connector J27 (Figure 1, Item 2) of winterization heater control box assembly.

4. Remove two screws (Figure 1, Item 3), lockwashers (Figure 1, Item 4), and washers (Figure 1, Item 5), and remove winterization heater control box assembly (Figure 1, Item 6) from rear of generator housing.

REMOVAL - Continued

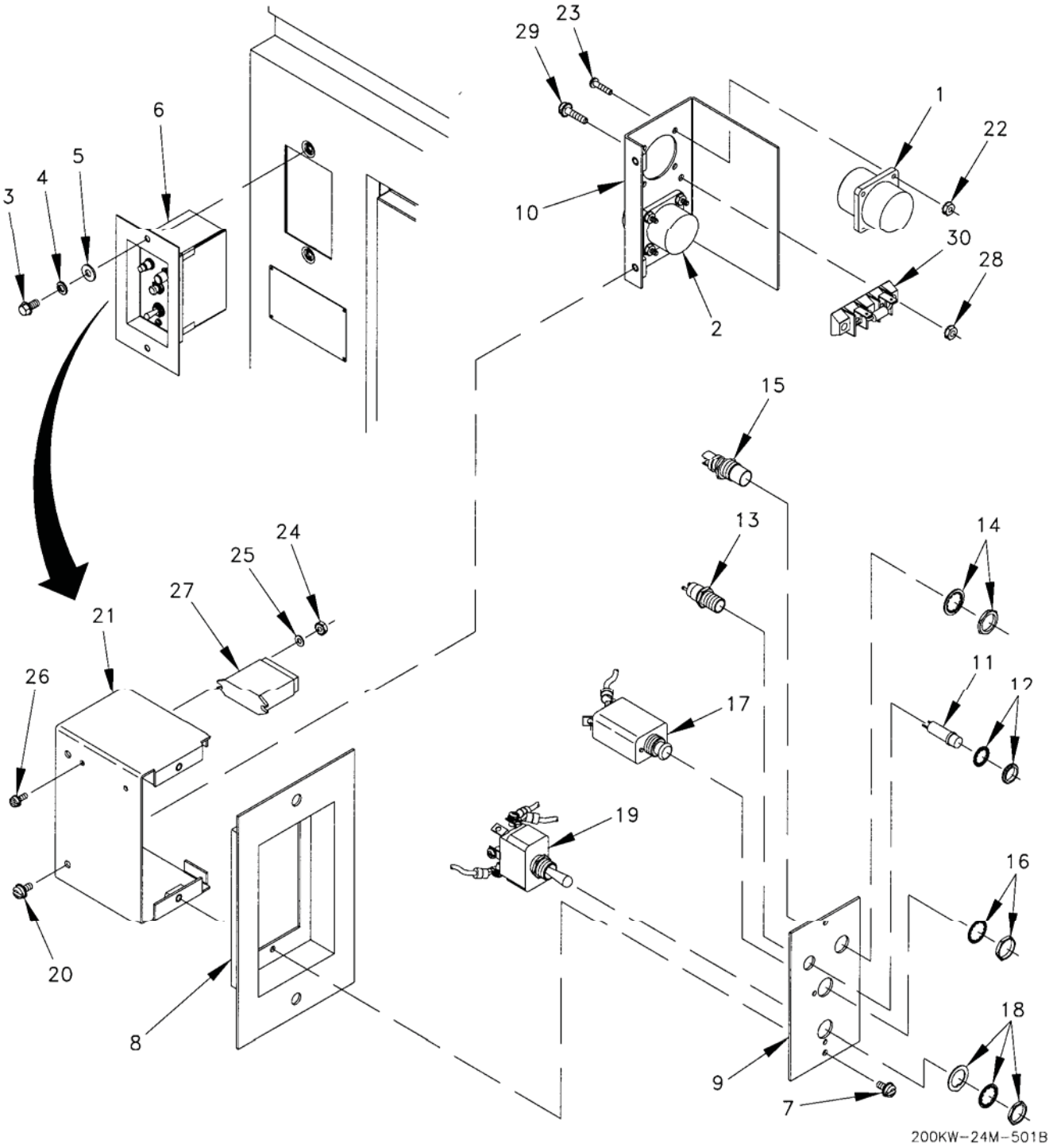

Figure 1. Winterization Heater Control Box Assembly.

END OF TASK

DISASSEMBLY

1. Remove two screws (Figure 1, Item 7), control box mounting bracket (Figure 1, Item 8), and control box faceplate (Figure 1, Item 9) from control box frame (Figure 1, Item 10).

NOTE

Tag and disconnect wiring during component removal.

2. Remove collar (Figure 1, Item 11), jam nut and lockwasher (Figure 1, Item 12), and LED holder (Figure 1, Item 13) from control box faceplate (Figure 1, Item 8).

3. Remove jam nut and lockwasher (Figure 1, Item 14), and press-test indicator light (Figure 1, Item 15) from control box faceplate (Figure 1, Item 8).

4. Remove jam nut and lockwasher (Figure 1, Item 16) and circuit breaker (Figure 1, Item 17) from control box faceplate (Figure 1, Item 8).

5. Remove jam nut and lockwasher (Figure 1, Item 18) and toggle switch (Figure 1, Item 19) from control box faceplate (Figure 1, Item 8).

6. Remove two screws (Figure 1, Item 20) and control box cover (Figure 1, Item 21) from control box frame (Figure 1, Item 9).

7. Remove eight nuts (Figure 1, Item 22), screws (Figure 1, Item 23), connector J26 (Figure 1, Item 1) and J27 (Figure 1, Item 2) from control box frame (Figure 1, Item 9).

8. Remove two nuts (Figure 1, Item 24), washers (Figure 1, Item 25), screws (Figure 1, Item 26), and relay (Figure 1, Item 27) from control box frame (Figure 1, Item 9).

9. Remove two nuts (Figure 1, Item 28), screws (Figure 1, Item 29), and terminal block and rectifier assembly (Figure 1, Item 30) from control box frame (Figure 1, Item 9).

END OF TASK

ASSEMBLY

NOTE

Connect wiring as tagged and remove tags during component installation.

1. Install terminal block and rectifier assembly (Figure 1, Item 30) on control box frame (Figure 1, Item 9) with two screws (Figure 1, Item 29) and nuts (Figure 1, Item 28).

2. Install relay (Figure 1, Item 27) on control box frame (Figure 1, Item 9) with two screws (Figure 1, Item 26), washers (Figure 1, Item 25), and nuts (Figure 1, Item 24).

3. Install connectors J27 and J26 (Figure 1, Item 2) and (Figure 1, Item 1) on control box frame (Figure 1, Item 9) with eight screws (Figure 1, Item 23) and nuts (Figure 1, Item 22).

ASSEMBLY - Continued

4. Install control box cover (Figure 1, Item 21) on control box frame (Figure 1, Item 9) with two screws (Figure 1, Item 20).

5. Install toggle switch (Figure 1, Item 19) on control box faceplate (Figure 1, Item 8) with jam nut and lockwasher (Figure 1, Item 18).

6. Install circuit breaker (Figure 1, Item 17) on control box faceplate (Figure 1, Item 8) with jam nut and lockwasher (Figure 1, Item 16).

7. Install press-test indicator light (Figure 1, Item 15) and install jam nut and lockwasher (Figure 1, Item 14) on control box faceplate (Figure 1, Item 8),

8. Install LED holder (Figure 1, Item 13) on control box faceplate (Figure 1, Item 9) and install jam nut and lockwasher (Figure 1, Item 12) and collar (Figure 1, Item 11).

9. Install control box faceplate (Figure 1, Item 9) and control box mounting bracket (Figure 1, Item 8) on control box frame (Figure 1, Item 10) with two screws (Figure 1, Item 7).

END OF TASK

INSTALLATION

1. Install winterization heater control box assembly (Figure 1, Item 6) on rear of generator housing and secure with two washers (Figure 1, Item 5), lockwashers (Figure 1, Item 4), and screws (Figure 1, Item 3).

2. Connect connector P27 to connector J27 (Figure 1, Item 2) and connector P26 to connector J26 (Figure 1, Item 1).

3. Close left rear doors.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

WINTERIZATION HEATER ASSEMBLY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools	**Personnel Required**
Tool Kit, General Mechanic's (WP 0123, Item 1)	One
Materials/Parts	**References**
Cap and plug set (WP 0124, Item 6)	TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

When running, winterization heater has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow heater to cool before performing maintenance. Wear gloves and additional protective clothing as required. Failure to comply can cause serious injury to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the heater system.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Open right and left battery access doors and right front doors.

3. Close shutoff valves (Figure 1, Item 1) and (Figure 1, Item 2).

4. Disconnect and remove hose clamp (Figure 1, Item 3) and disconnect low-pressure hose (Figure 1, Item 4), fuel pump harness (Figure 1, Item 9), fuel metering pump (Figure 1, Item 5) from inside of heater (Figure 1, Item 6).

5. Remove hose clamp (Figure 1, Item 7) and disconnect flexible braided leak-off hose (Figure 1, Item 8) from OUT side of fuel metering pump (Figure 1, Item 5) on heater (Figure 1, Item 6).

6. Disconnect generator set wiring harness (Figure 1, Item 9) (2 places) from heater (Figure 1, Item 6).

7. Remove hose clamp (Figure 1, Item 10) and disconnect 90-degree elbow coolant hose (Figure 1, Item 11) from fitting on top of heater (Figure 1, Item 6).

8. Remove hose clamp (Figure 1, Item 12) and disconnect coolant hose (Figure 1, Item 13) from bottom of heater (Figure 1, Item 6).

9. Remove screw (Figure 1, Item 14), washer (Figure 1, Item 15), clamp (Figure 1, Item 16), and fuel metering pump (Figure 1, Item 5) from heater (Figure 1, Item 6).

10. Remove hose clamp (Figure 1, Item 17) and disconnect flexible exhaust tubing (Figure 1, Item 18) from heater (Figure 1, Item 6).

11. Remove screw (Figure 1, Item 19), lockwasher (Figure 1, Item 20), and clamp (Figure 1, Item 21).

12. Remove four screws (Figure 1, Item 22), lockwashers (Figure 1, Item 23), washers (Figure 1, Item 24), and heater (Figure 1, Item 6) from skid base.

END OF TASK

INSTALLATION

1. Install heater (Figure 1, Item 6) and secure with four screws (Figure 1, Item 22), lockwashers (Figure 1, Item 23), and washers (Figure 1, Item 24).

2. Install clamp (Figure 1, Item 21), and secure with lockwasher (Figure 1, Item 20) and screw (Figure 1, Item 19).

3. Connect flexible exhaust tubing (Figure 1, Item 18) on heater (Figure 1, Item 6) and install hose clamp (Figure 1, Item 17).

4. Install fuel metering pump (Figure 1, Item 5) and clamp (Figure 1, Item 16) on heater (Figure 1, Item 6) and secure with washer (Figure 1, Item 15) and screw (Figure 1, Item 14).

INSTALLATION - Continued

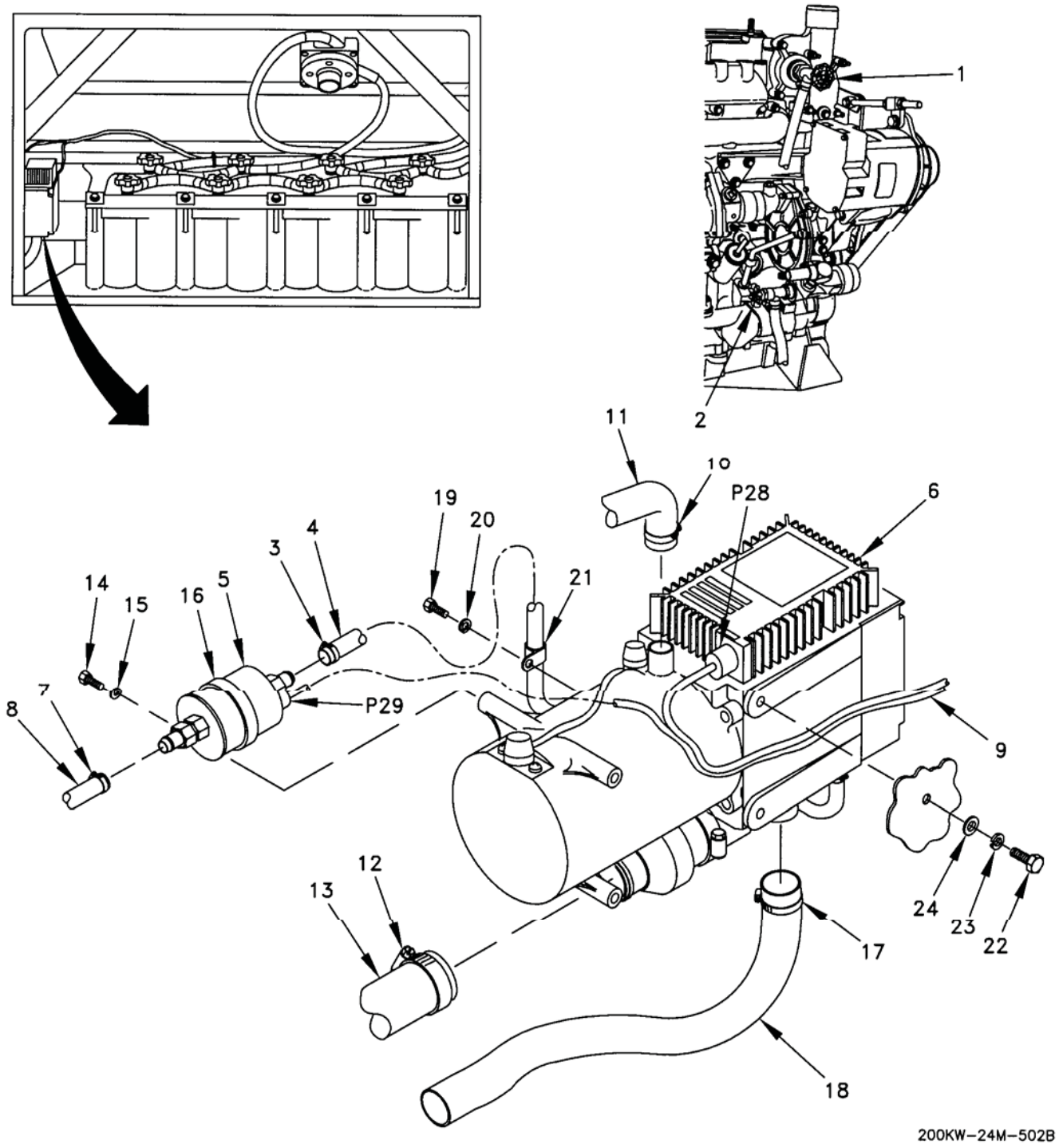

Figure 1. Winterization Heater Assembly.

INSTALLATION - Continued

5. Connect coolant hose (Figure 1, Item 13) to bottom of heater (Figure 1, Item 6) and install hose clamp (Figure 1, Item 12).

6. Connect 90-degree elbow coolant hose (Figure 1, Item 11) to top of heater (Figure 1, Item 6) and install hose clamp (Figure 1, Item 10).

7. Connect generator set wiring harness (Figure 1, Item 9) to heater (Figure 1, Item 6) in two places.

8. Connect flexible braided leak-off hose (Figure 1, Item 8) to OUT side of fuel metering pump (Figure 1, Item 5) and install hose clamp (Figure 1, Item 7).

9. Connect low-pressure hose (Figure 1, Item 4), hose clamp (Figure 1, Item 3) and fuel metering pump (Figure 1, Item 5) to inside of fuel pump (Figure 1, Item 6)

10. Open shutoff valves (Figure 1, Item 1) and (Figure 1, Item 2).

WARNING

Operating the generator set with any access door open exposes personnel to a high noise level. Hearing protection must be worn when operating or working near the generator set with any access door open. Failure to comply can cause hearing damage to personnel.

11. Operate engine and check for leaks.

12. Close right and left battery access doors and right front doors.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

WINTERIZATION HEATER HOSES MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Personnel Required

One

Materials/Parts

Cap and plug set (WP 0124, Item 6)
Sealing compound (WP 0124, Item 40)

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

When running, winterization heater has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow heater to cool before performing maintenance. Wear gloves and additional protective clothing as required. Failure to comply can cause serious injury to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the heater system.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.
2. Open battery access doors, right front doors, and left front door.
3. Use suitable container and drain cooling system (see WP 0064).
4. Remove hose clamp (Figure 1, Item 1) and disconnect hose (Figure 1, Item 2) from shutoff valve (Figure 1, Item 3) located behind alternator.
5. Remove hose clamp (Figure 1, Item 4) and disconnect hose (Figure 1, Item 2) from hose mender fitting (Figure 1, Item 5) at top of heater (Figure 1, Item 6), and remove hose (Figure 1, Item 2).
6. Remove two hose clamps (Figure 1, Item 7), hose mender fitting (Figure 1, Item 5), and 90-degree hose elbow (Figure 1, Item 8) from heater (Figure 1, Item 6).
7. Remove hose clamp (Figure 1, Item 9) and disconnect hose (Figure 1, Item 10) from shutoff valve (Figure 1, Item 11) located below alternator.
8. Disconnect and remove hose clamp (Figure 1, Item 12) and disconnect hose (Figure 1, Item 10) from bottom of heater (Figure 1, Item 6), and remove hose (Figure 1, Item 10).
9. Remove screw (Figure 1, Item 13), lockwasher (Figure 1, Item 14), and clamp (Figure 1, Item 15).
10. Remove hose clamp (Figure 1, Item 16) and disconnect low-pressure hose (Figure 1, Item 17) from IN side of fuel metering pump (Figure 1, Item 18).
11. Disconnect and remove hose clamp (Figure 1, Item 19) and disconnect low-pressure hose (Figure 1, Item 17) from nose fitting (Figure 1, Item 20) on left side of fuel tank, and remove hose (Figure 1, Item 17).
12. Remove two hose clamps (Figure 1, Item 21) and remove flexible braided leak-off hose (Figure 1, Item 22) from OUT side of fuel filter (Figure 1, Item 18) and from bottom of heater (Figure 1, Item 6).
13. Remove hose clamp (Figure 1, Item 23) and disconnect flexible exhaust tubing (Figure 1, Item 24) from heater (Figure 1, Item 6) and from heater exhaust adapter (Figure 1, Item 25).
14. Remove four screws (Figure 1, Item 26), lockwashers (Figure 1, Item 27), washers (Figure 1, Item 28), and heater exhaust adapter (Figure 1, Item 25) from skid base.
15. Remove shutoff valve (Figure 1, Item 11) and shutoff valve (Figure 1, Item 3).

END OF TASK

INSTALLATION

NOTE

Apply sealing compound to all male pipe threads before connecting.

1. Install shutoff valve (Figure 1, Item 11) and shutoff valve (Figure 1, Item 3).

INSTALLATION - Continued

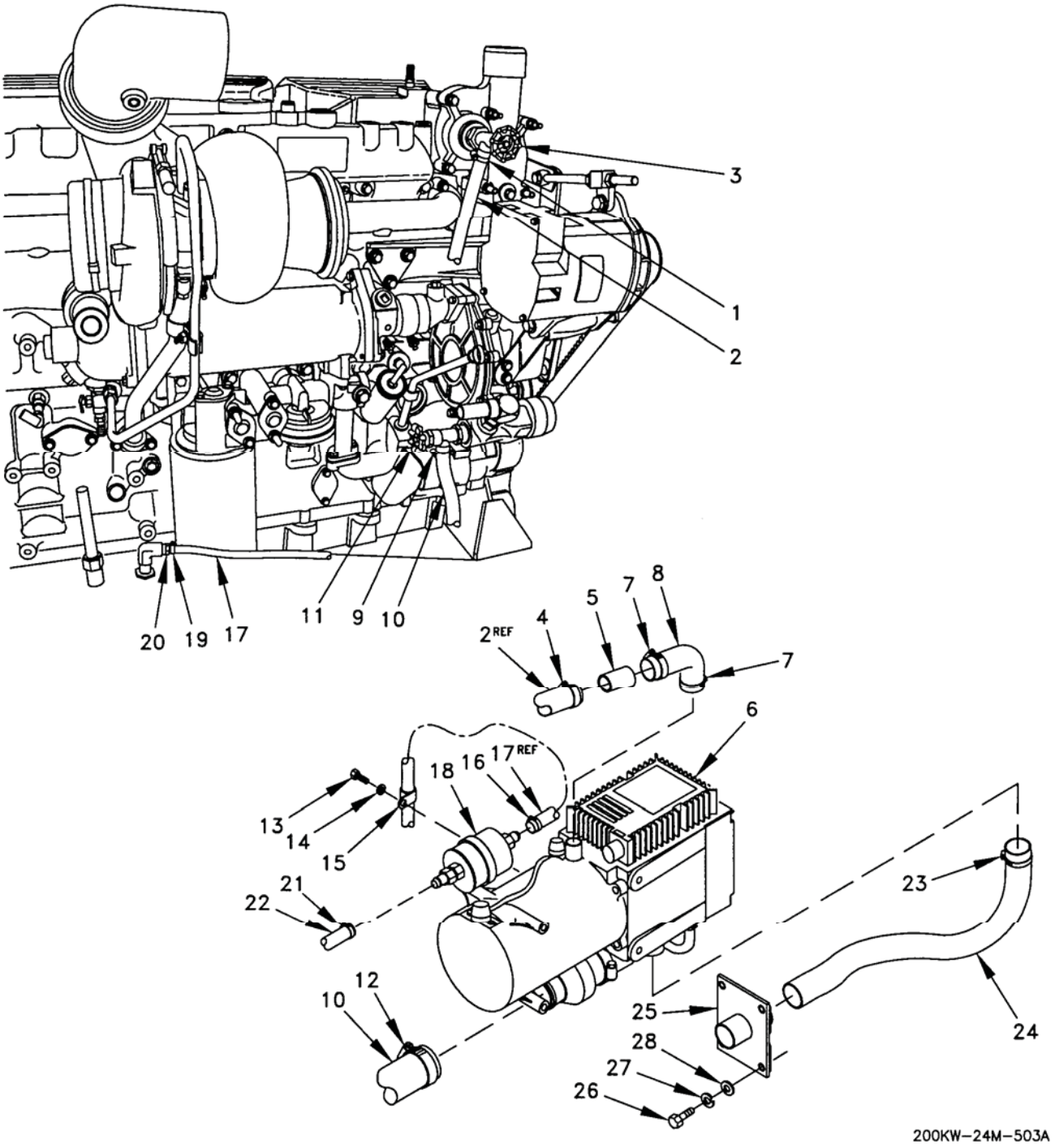

Figure 1. Winterization Heater Hoses.

INSTALLATION - Continued

2. Install heater exhaust adapter (Figure 1, Item 25) on skid base and secure with four washers (Figure 1, Item 28), lockwashers (Figure 1, Item 27), and screws (Figure 1, Item 26).

3. Connect flexible exhaust tubing (Figure 1, Item 24) to heater exhaust adapter (Figure 1, Item 25) and to heater (Figure 1, Item 6) and install hose clamp (Figure 1, Item 23).

4. Connect flexible braided leak-off hose (Figure 1, Item 22) to OUT side of fuel metering pump (Figure 1, Item 18) and to bottom of heater (Figure 1, Item 6) and install two hose clamps (Figure 1, Item 21).

5. Connect low-pressure hose (Figure 1, Item 17) to male hose barb fitting (Figure 1, Item 20) on left side of fuel tank and install hose clamp (Figure 1, Item 19).

6. Connect low-pressure hose (Figure 1, Item 17) to IN side of fuel metering pump (Figure 1, Item 18) and install hose clamp (Figure 1, Item 16).

7. Install clamp (Figure 1, Item 15), lockwasher (Figure 1, Item 14), and screw (Figure 1, Item 13) on hose (Figure 1, Item 17).

8. Connect hose (Figure 1, Item 10) to bottom of heater (Figure 1, Item 6) and install hose clamp (Figure 1, Item 12).

9. Connect hose (Figure 1, Item 10) to shutoff valve (Figure 1, Item 11) located below alternator and install hose clamp (Figure 1, Item 9).

10. Install 90-degree hose elbow (Figure 1, Item 8) and hose mender fitting (Figure 1, Item 5) on heater (Figure 1, Item 6) and install two hose clamps (Figure 1, Item 7).

11. Connect hose (Figure 1, Item 2) to hose mender fitting (Figure 1, Item 5) and install hose clamp (Figure 1, Item 4).

12. Connect hose (Figure 1, Item 2) to shutoff valve (Figure 1, Item 3) located behind alternator and install hose clamp (Figure 1, Item 1).

13. Refill cooling system (see WP 0064).

14. Close left front door, battery access doors, and right front doors.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

WINTERIZATION THERMOSTAT, RESISTORS, AND DIODE MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Personnel Required

One

Materials/Parts

Insulation sleeving (WP 0124, Item 22)
Marker tags (WP 0124, Item 49)
Solder (WP 0124, Item 44)
Tiedown strap (WP 0124, Item 47)

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

Avoid breathing fumes generated by soldering. Eye protection is required. Good general ventilation is normally adequate. Failure to comply can cause injury to personnel.

REMOVAL

NOTE

Cut tiedown straps as required.

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Open control box door and control box panel.

3. To remove thermostat (Figure 1, Item 1), at left side of control box assembly, tag and disconnect spade terminals as follows:

   Lead from TS-1 to TB 4-17
   Lead from TS-2 to TB 4-12

4. Remove two nuts (Figure 1, Item 2), screws (Figure 1, Item 3), and thermostat (Figure 1, Item 1).

5. To remove either resistor HTR1 (Figure 1, Item 4), located below GSC, or HTR2 (Figure 1, Item 5), located on right side of control panel, unsolder leads and remove two nuts (Figure 1, Item 6), screws (Figure 1, Item 7), and resistor (Figure 1, Item 4) or (Figure 1, Item 5).

6. Tag and disconnect spade terminals and wiring as follows:

   HTR-1 lead 1 to TB4-10B
   HTR-2 lead 1 to TB3-10B
   HTR-1 lead 2 to HTR-2 lead 2

NOTE

Note orientation of diode before removing.

7. To remove diode (Figure 1, Item 8), tag and disconnect spade terminals as follows:

   Cathode of diode to TB4-10
   Anode of diode to TB4-12

8. Remove diode (Figure 1, Item 8).

END OF TASK

INSTALLATION

NOTE

Install tiedown straps as required.

1. To install diode (Figure 1, Item 8), connect spade terminals as follows:

   Cathode of diode to TB4-10
   Anode of diode to TB4-12

INSTALLATION - Continued

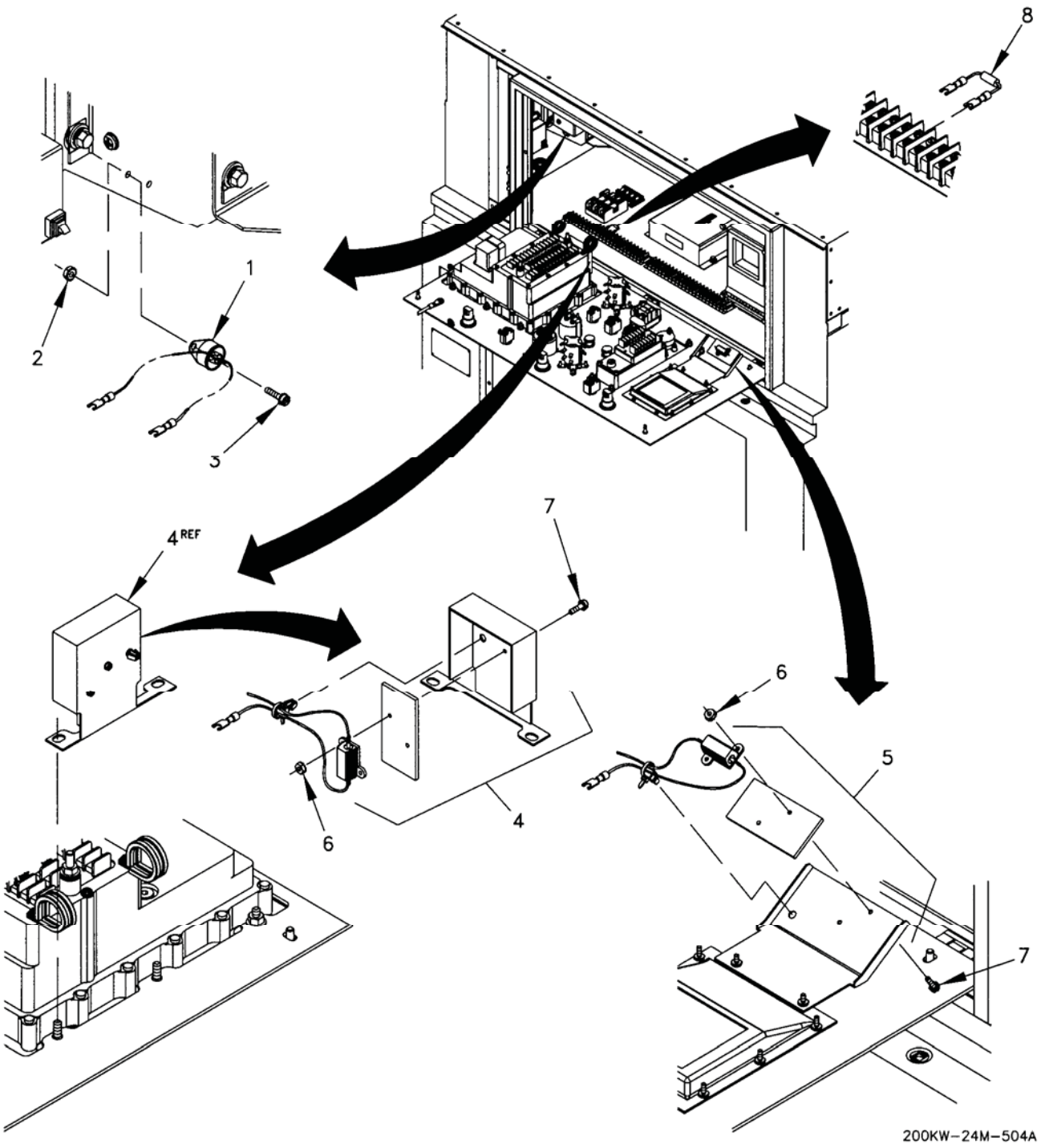

Figure 1. Winterization Thermostat, Resistors, and Diode.

INSTALLATION - Continued

NOTE

Replace heat shrink sleeving when soldering wiring on resistor leads.

2. To install resistor HTR1 (Figure 1, Item 4) or HTR2 (Figure 1, Item 5), position resistor and secure with two screws (Figure 1, Item 7) and nuts (Figure 1, Item 6).

3. Connect spade terminals as follows:

   HTR-1 lead 1 to TB4-10B
   HTR-2 lead 1 to TB3-10B
   HTR-1 lead 2 to HTR-2 lead 2

4. To install thermostat (Figure 1, Item 1), position thermostat and secure with two screws (Figure 1, Item 3) and nuts (Figure 1, Item 2).

5. Connect spade terminals to TB 4 as follows:

   Lead from TS-1 to TB 4-17
   Lead from TS-2 to TB 4-12

6. Close control box panel and control box door.

END OF TASK

END OF WORK PACKAGE

UNIT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

WINTERIZATION WIRING HARNESSES MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0123, Item 1)

Personnel Required

One

Materials/Parts

Marker tags (WP 0124, Item 49)
Tiedown strap (WP 0124, Item 47)

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

When running, winterization heater has hot metal surfaces that will burn flesh on contact. Shut down generator set and allow heater to cool before performing maintenance. Wear gloves and additional protective clothing as required. Failure to comply can cause serious injury to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the air cleaner system.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. On winterization heater (Figure 1, Item 7), disconnect connector P28 (Figure 1, Item 8) from/to heater metering pump, and connector P29 (Figure 1, Item 9) from end of heater.

NOTE

Cut tiedown straps as required.

3. Open left rear doors and battery access doors.

4. To remove winterization power input wiring harness, disconnect connector P26 (Figure 1, Item 1) from connector J26 (Figure 1, Item 2) on rear of winterization heater control box (Figure 1, Item 3).

5. On terminal board TB5 (Figure 1, Item 4), tag and disconnect three spade terminals from TB5-15A, TB5-16A, and TB5-17A.

6. To remove heater to heater control box wiring harness, disconnect connector P27 (Figure 1, Item 5) from connector J27 (Figure 1, Item 6) on rear of winterization heater control box (Figure 1, Item 3).

7. On terminal board TB5 (Figure 1, Item 4), tag and disconnect spade terminal from TB5-17B.

8. Remove winterization heater to heater control box wiring harness.

END OF TASK

INSTALLATION

NOTE

Install tiedown straps as required.

1. To install winterization heater to heater control box wiring harness, connect spade terminal to TB5-17B on terminal board TB5 (Figure 1, Item 4).

2. Connect connector P27 (Figure 1, Item 5) to connector J27 (Figure 1, Item 6) on rear of winterization heater control box (Figure 1, Item 3).

3. To install winterization power wiring harness, connect three spade terminals to TB5-17A, TB5-16A, and TB5-15A on terminal board TB5 (Figure 1, Item 4).

4. Connect connector J26 (Figure 1, Item 2) to connector P26 (Figure 1, Item 1) on rear of winterization heater control box (Figure 1, Item 3).

5. Connect connector P29 (Figure 1, Item 9) to end of heater (Figure 1, Item 7), and connector P28 (Figure 1, Item 8) to top of heater.

6. Close left rear doors and battery access doors.

INSTALLATION - Continued

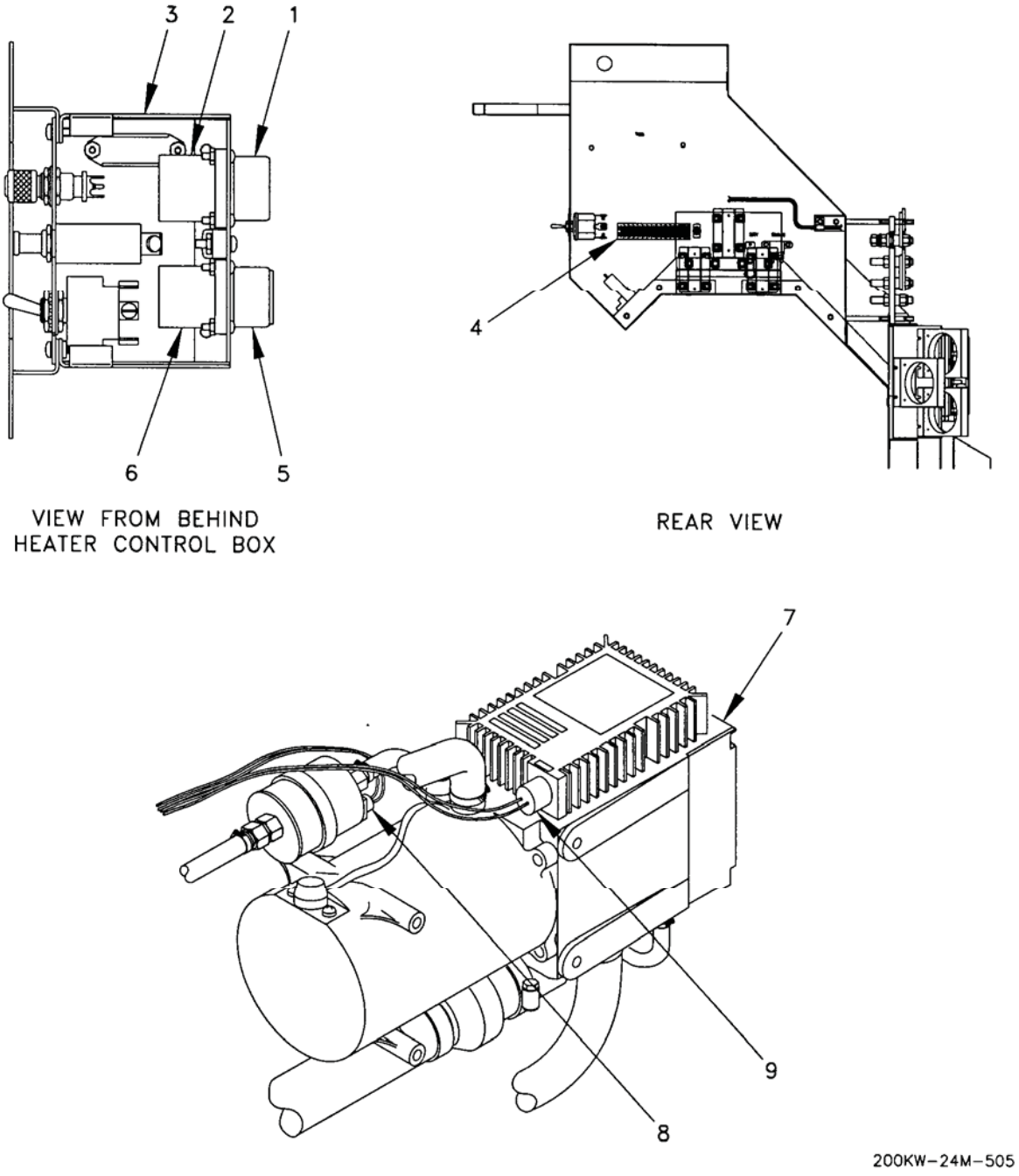

Figure 1. Winterization Wiring Harnesses.

END OF TASK

END OF WORK PACKAGE

CHAPTER 5

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE INSTRUCTIONS

CHAPTER 5

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE INSTRUCTIONS

WORK PACKAGE INDEX

Title	WP Sequence No.
GENERATOR REPAIR	0094
GENERATOR REPLACEMENT	0095
ENGINE REPLACEMENT	0096
ENGINE/GENERATOR BASE ASSEMBLY REPAIR	0097
ENGINE ELECTRICAL SYSTEM REPAIR	0098
FAN PULLEY MAINTENANCE	0099
VALVE COVER AND BASE MAINTENANCE	0100
FUEL FILTER BASE AND MANIFOLD MAINTENANCE	0101
FUEL TRANSFER PUMP MAINTENANCE	0102
TURBOCHARGER MAINTENANCE	0103
CRANKSHAFT VIBRATION DAMPER AND PULLEY MAINTENANCE	0104
CRANKSHAFT FRONT SEAL MAINTENANCE	0105
FRONT COVER MAINTENANCE	0106
OIL FILTER BASE MAINTENANCE	0107
OIL COOLER MAINTENANCE	0108
OIL PUMP MAINTENANCE	0109
WATER PUMP MAINTENANCE	0110
FLYWHEEL MAINTENANCE	0111
CRANKSHAFT REAR SEAL MAINTENANCE	0112
FLYWHEEL HOUSING MAINTENANCE	0113
CRANKSHAFT REAR SEAL CARRIER MAINTENANCE	0114
EXHAUST MANIFOLD MAINTENANCE	0115
INLET MANIFOLD MAINTENANCE	0116
OIL PAN MAINTENANCE	0117
UNIT INJECTOR MAINTENANCE	0118
ROCKER SHAFT AND PUSHROD MAINTENANCE	0119
CYLINDER HEAD MAINTENANCE	0120

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
GENERATOR REPAIR

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Shop Equipment, Field Maintenance, Basic (WP 0123, Item 3)

Materials/Parts

Alcohol (WP 0124, Item 4)
Breakthrough cleaning solvent (WP 0124, Item 45)
Crocus cloth (WP 0124, Item 9)
Grease (WP 0124, Item 19)
Oil (WP 0124, Items 23-30)
Wiping rags (WP 0124, Item 35)

Personnel Required

One

References

TM 9-237
TM 9-6115-730-24P

Equipment Condition

If necessary for disassembly/repair, generator removed from generator set (WP 0097)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DISASSEMBLY

1. Remove twelve screws (Figure 1, Item 1) and cover (Figure 1, Item 2) from body assembly (Figure 1, Item 3).

CAUTION

Bearing bracket supports the main rotor, which will drop and sustain damage when bearing bracket is removed. To avoid damage to rotor, bar rotor so that two main rotor poles are vertical in stator. This will limit amount of rotor drop.

2. Bar rotor (Figure 1, Item 4) so that two main rotor poles are vertical in body assembly (Figure 1, Item 3).

NOTE

Tag and disconnect wiring before removal of components as required.

3. Remove eight screws (Figure 1, Item 5), lockwashers (Figure 1, Item 6), nuts (Figure 1, Item 7), and bearing bracket (Figure 1, Item 8) with exciter stator (Figure 1, Item 9) attached.

CAUTION

If bearing needs to be removed, it is easily damaged, and should be replaced.

4. Use bearing puller to remove bearing (Figure 1, Item 10) from shaft of rotor (Figure 1, Item 4) and discard bearing.

5. Remove rotating rectifier (Figure 1, Item 11) from rotor (Figure 1, Item 4).

CAUTION

Magnets in exciter stator are very strong and will attract loose screws, washers, etc, which may cause damage to stator. Keep loose hardware away from stator. Strong magnets in stator will also impede removal of stator.

6. Note orientation of Belleville washers (Figure 1, Item 12) and remove four screws (Figure 1, Item 13), Belleville washers (Figure 1, Item 12), and exciter stator (Figure 1, Item 9) from bearing bracket (Figure 1, Item 8).

7. Remove two nuts (Figure 1, Item 14), screws (Figure 1, Item 15), and exhaust screen (Figure 1, Item 16).

8. Remove 16 screws (Figure 1, Item 17), lockwashers (Figure 1, Item 18), washers (Figure 1, Item 19), and flywheel housing adapter (Figure 1, Item 20).

CAUTION

Rotor and attached parts must be removed carefully to avoid damaging rotor or stator windings. Do not apply any force to fan when removing rotor to avoid damage to fan.

9. Use suitable rotor lifting device to carefully remove rotor (Figure 1, Item 4) and attached parts from body assembly (Figure 1, Item 3).

DISASSEMBLY - Continued

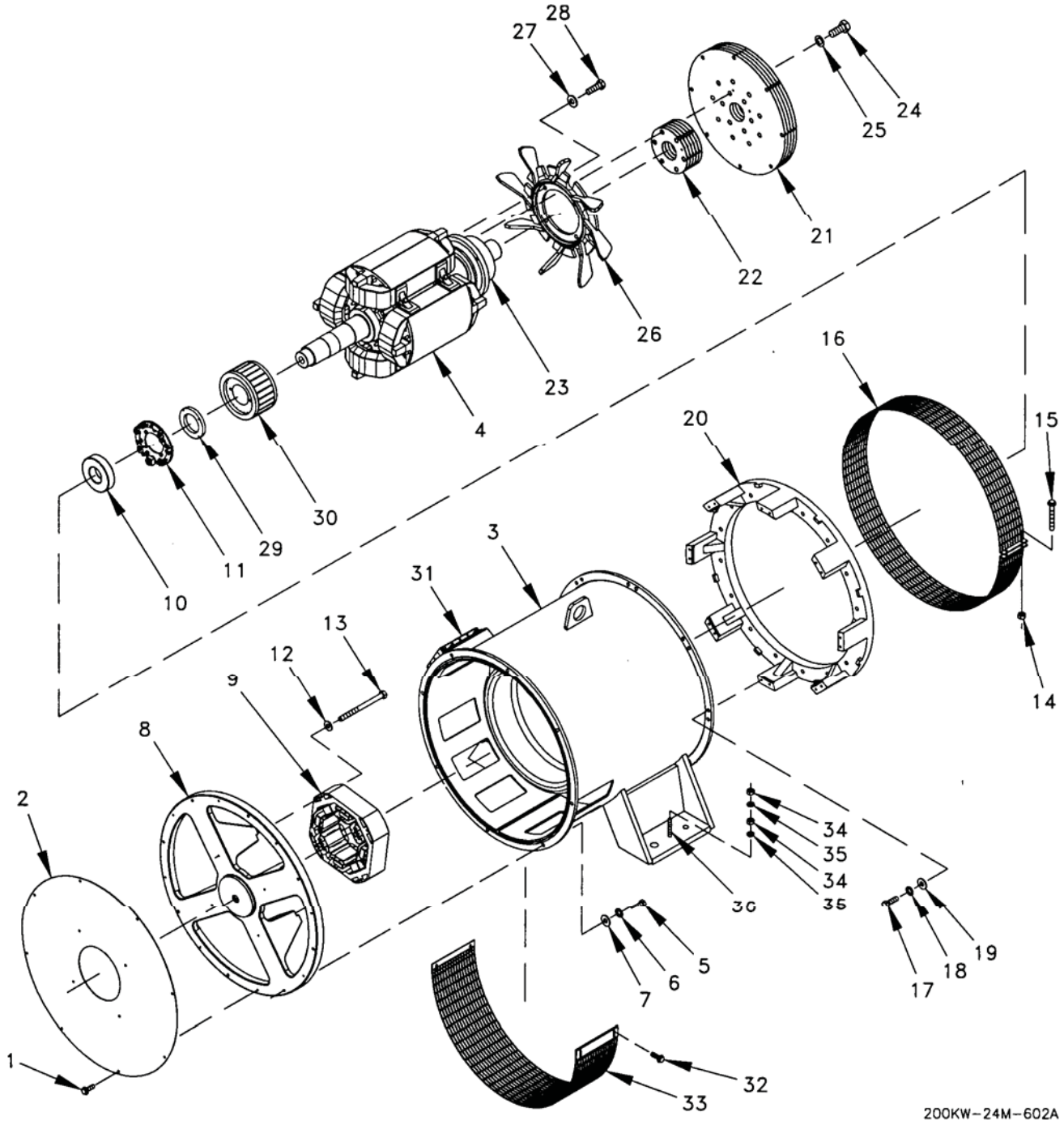

Figure 1. Generator Repair.

DISASSEMBLY - Continued

10. Mark drive discs (Figure 1, Item 21), spacer discs (Figure 1, Item 22), and drive hub (Figure 1, Item 23) for proper alignment during assembly.

11. Remove six screws (Figure 1, Item 24), washers (Figure 1, Item 25), five drive discs (Figure 1, Item 21) and six spacer discs (Figure 1, Item 22) from drive hub (Figure 1, Item 23).

12. Mark fan (Figure 1, Item 26) and drive hub (Figure 1, Item 23) for proper alignment and balancing of fan during assembly.

13. Note orientation of Belleville washers (Figure 1, Item 27) as they are removed, and remove four screws (Figure 1, Item 28), Belleville washers (Figure 1, Item 27), and fan (Figure 1, Item 26) from drive hub (Figure 1, Item 23).

WARNING

Wear heat resistant gloves and avoid contacting hot metal surfaces with your hands after generator drive hub has been heated. Wear additional protective clothing as required. Failure to comply can cause injury to personnel.

14. Install suitable puller to drive hub (Figure 1, Item 23). Use torch to rapidly heat only outside diameter of drive hub (Figure 1, Item 23) (to avoid expanding rotor shaft) while tightening puller. Remove drive hub (Figure 1, Item 23) from rotor (Figure 1, Item 4).

15. Remove rectifier mounting hub (Figure 1, Item 29) and exciter rotor (Figure 1, Item 30) from rotor (Figure 1, Item 4).

16. If necessary, remove lead block assembly (Figure 1, Item 31).

17. Remove four screws (Figure 1, Item 32) and intake air screen (Figure 1, Item 33).

18. If necessary, remove nameplate and three decals.

19. Remove two nuts (Figure 1, Item 34), two lockwashers (Figure 1, Item 35), and grounding stud (Figure 1, Item 36).

END OF TASK

CLEANING

CAUTION

Winding varnishes are epoxy or polyester based. Do not use any cleaning materials which will attack these materials. Be careful not to damage magnet wire or winding insulation. Do not use a wire brush

1. Most components of the generator can be cleaned with alcohol or Breakthrough cleaning solvent and a soft brush or cloth.

CLEANING - Continued

WARNING

Cleaning with compressed air can cause flying particles. When using compressed air, wear protective glasses and use clean, low pressure air, less than 30 psi (208 kPa). Failure to comply can cause eye injury to personnel.

2. Compressed air may be used to clean dirt from areas where a cloth will not reach. Use low pressure compressed air, 30 psi maximum.

3. Dry dust and dirt may be removed by vacuum cleaning.

4. When completely disassembled, most generator components (except electronic parts) may be steam cleaned.

5. Make sure all components are completely dry before assembly.

END OF TASK

ASSEMBLY

1. Install grounding stud (Figure 1, Item 36), two lockwashers (Figure 1, Item 35), and two nuts (Figure 1, Item 34).

2. If removed, install three decals and nameplate.

3. Install intake air screen (Figure 1, Item 33) and four screws (Figure 1, Item 32).

4. If removed, install lead block assembly (Figure 1, Item 31).

5. Install exciter rotor (Figure 1, Item 30) and rectifier mounting hub (Figure 1, Item 29) on rotor (Figure 1, Item 4).

WARNING

Wear heat resistant gloves and avoid contacting hot metal surfaces with your hands after generator drive hub has been heated. Wear additional protective clothing as required. Failure to comply can cause injury to personnel.

6. Heat new drive hub (Figure 1, Item 23) in oven to 500-600 degrees F (260-316 degrees C). Using suitable heat resistant gloves, slide drive hub (Figure 1, Item 23) on shaft until it seats against shaft shoulder. Allow drive hub (Figure 1, Item 23) to cool for one hour.

CAUTION

Fan and drive hub must be install and aligned properly to avoid an unbalanced condition and considerable vibration.

7. Align marks on fan (Figure 1, Item 26) with marks on drive hub (Figure 1, Item 23). Note orientation of Belleville washers (Figure 1, Item 27). Install fan (Figure 1, Item 26), four Belleville washers (Figure 1, Item 27), and screws (Figure 1, Item 28). Torque screws (Figure 1, Item 28) in an alternating pattern to 60 lb-ft (81 Nm).

ASSEMBLY - Continued

8. Align marks made on drive discs (Figure 1, Item 21) and spacer discs (Figure 1, Item 22) with marks on drive hub (Figure 1, Item 23). Install five spacer discs (Figure 1, Item 22), five drive discs (Figure 1, Item 21), six washers (Figure 1, Item 25) and screws (Figure 1, Item 24). Torque screws (Figure 1, Item 24) in an alternating pattern to 192 lb-ft (260 Nm).

CAUTION

Rotor and attached parts must be installed carefully to avoid damaging rotor or stator windings.

9. Use suitable lifting device and carefully install rotor (Figure 1, Item 4) and attached parts into body assembly (Figure 1, Item 3).

10. Install flywheel housing adapter (Figure 1, Item 20), 16 washers (Figure 1, Item 19), lockwashers (Figure 1, Item 18), and screws (Figure 1, Item 17). Torque screws (Figure 1, Item 17) in an alternating pattern to 25 lb-ft (34 Nm).

11. Install exhaust screen (Figure 1, Item 16), two screws (Figure 1, Item 15), and nuts (Figure 1, Item 14).

12. Note orientation of Belleville washers (Figure 1, Item 12). Install exciter stator (Figure 1, Item 9) in bearing bracket (Figure 1, Item 8) and install four Belleville washers (Figure 1, Item 12) and screws (Figure 1, Item 13). Torque screws (Figure 1, Item 13) to 60 lb-ft (81 Nm).

13. Install rotating rectifier assembly (Figure 1, Item 11) on rotor (Figure 1, Item 4).

WARNING

Wear heat resistant gloves and avoid contacting hot metal surfaces with your hands after generator bearing has been heated. Wear additional protective clothing as required. Failure to comply can cause injury to personnel.

CAUTION

Do not strike bearing directly with hammer. Do not apply pressure to outer race. Use only light taps from a soft mallet, or bearing will be damaged.

14. Heat new bearing (Figure 1, Item 10) in an oven to a maximum of 212 degrees F (100 degrees C). Apply a thin coat of clean oil to the press fit area of the shaft on rotor (Figure 1, Item 4). Using heat resistant gloves, install bearing (Figure 1, Item 10) over end of shaft until it seats against shaft shoulder. Bearing should slide on shaft and be seated without excessive force. If bearing binds on shaft before fully seated, use a piece of tubing slightly larger than the press fit area and a soft mallet to drive bearing into place. Use light taps and apply pressure only to inner race of bearing. After installation, allow bearing to cool for one hour before continuing assembly of generator.

15. After bearing (Figure 1, Item 10) has cooled, fill bearing grease cavity one third to one half full of grease.

ASSEMBLY - Continued

16. Install bearing bracket (Figure 1, Item 8) with exciter stator (Figure 1, Item 9) attached onto body assembly (Figure 1, Item 3) with eight washers (Figure 1, Item 7), lockwashers (Figure 1, Item 6), and screws (Figure 1, Item 5). Torque screws (Figure 1, Item 5) in an alternating pattern to 25 lb-ft (34 Nm).

17. Install cover (Figure 1, Item 2) and 12 screws (Figure 1, Item 1). Torque screws (Figure 1, Item 1) in an alternating pattern to 25 lb-ft (34 Nm).

END OF TASK

END OF WORK PACKAGE

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
GENERATOR REPLACEMENT

INITIAL SETUP:

Tools and Special Tools

Lifting Device, 2,600 lb (1180 kg) Capacity
Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Shop Equipment, Field Maintenance, Basic (WP 0123, Item 3)

Personnel Required

Two

References

TM 9-6115-730-24P

Equipment Condition

Left rear door assembly removed (WP 0022)
Left rear door assembly (latch) removed (WP 0023)

Equipment Condition (cont.)

Right rear door assembly removed (WP 0027)
Right rear door assembly (latch) removed (WP 0028)
Front roof section housing assembly removed (WP 0030)
Rear roof section housing assembly removed (WP 0031)
Engine generator compartment ceiling assembly removed (WP 0032)
Generator access cover assembly removed (WP 0033)
Rear section housing assembly removed (WP 0035)
Right rear panel assembly removed (WP 0038)
Left rear panel assembly removed (WP 0039)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

REMOVAL

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

2. Disconnect wiring from generator (Figure 1, Item 1).

3. Remove eight screws (Figure 1, Item 2) and lockwashers (Figure 1, Item 3), and 12 screws (Figure 1, Item 4) and lockwashers (Figure 1, Item 5) connecting generator (Figure 1, Item 1) to engine (Figure 1, Item 6).

4. Remove two locknuts (Figure 1, Item 7), two screws (Figure 1, Item 8), four washers (Figure 1, Item 9), and two snubbing washers (Figure 1, Item 10) from generator shock mounts (Figure 1, Item 11).

WARNING

The generator weighs more than 2530 pounds (1148 kg) and requires an assistant and a lifting device (forklift, overhead lifting device) with sufficient capacity. Be careful and keep hands and arms out of the way when lifting generator out of engine generator base. Failure to comply can cause serious injury or death to personnel.

5. Attach suitable lifting device with at least 2600 lb (1180 kg) capacity to lifting eye (Figure 1, Item 12) on generator (Figure 1, Item 1) and take slack out of lifting device.

6. Loosen two nuts (Figure 1, Item 13) and turn two jackscrews (Figure 1, Item 14) clockwise (CW) to raise engine (Figure 1, Item 6) approximately 1/2 inch (1.27 cm) to allow separation of generator (Figure 1, Item 1) and engine (Figure 1, Item 6).

7. Carefully lift generator (Figure 1, Item 1) out of engine generator base.

END OF TASK

INSTALLATION

WARNING

The generator weighs more than 2530 pounds (1148 kg) and requires an assistant and a lifting device (forklift, overhead lifting device) with sufficient capacity. Be careful and keep hands and arms out of the way when lifting generator out of engine generator base. Failure to comply can cause serious injury or death to personnel.

1. Using suitable lifting device with at least 2600 lb (1180 kg) capacity, carefully lower generator (Figure 1, Item 1) onto engine generator base and align with engine (Figure 1, Item 6).

2. Turn two jackscrews (Figure 1, Item 14) counterclockwise (CCW) to lower engine (Figure 1, Item 6) into proper alignment with generator (Figure 1, Item 1). Tighten two nuts (Figure 1, Item 13).

3. Allow slack in lifting device and disconnect from lifting eye (Figure 1, Item 12) on generator (Figure 1, Item 1).

4. Install two snubbing washers (Figure 1, Item 10), four washers (Figure 1, Item 9), two screws (Figure 1, Item 8) and two locknuts (Figure 1, Item 7) on two generator shock mounts (Figure 1, Item 11).

INSTALLATION - Continued

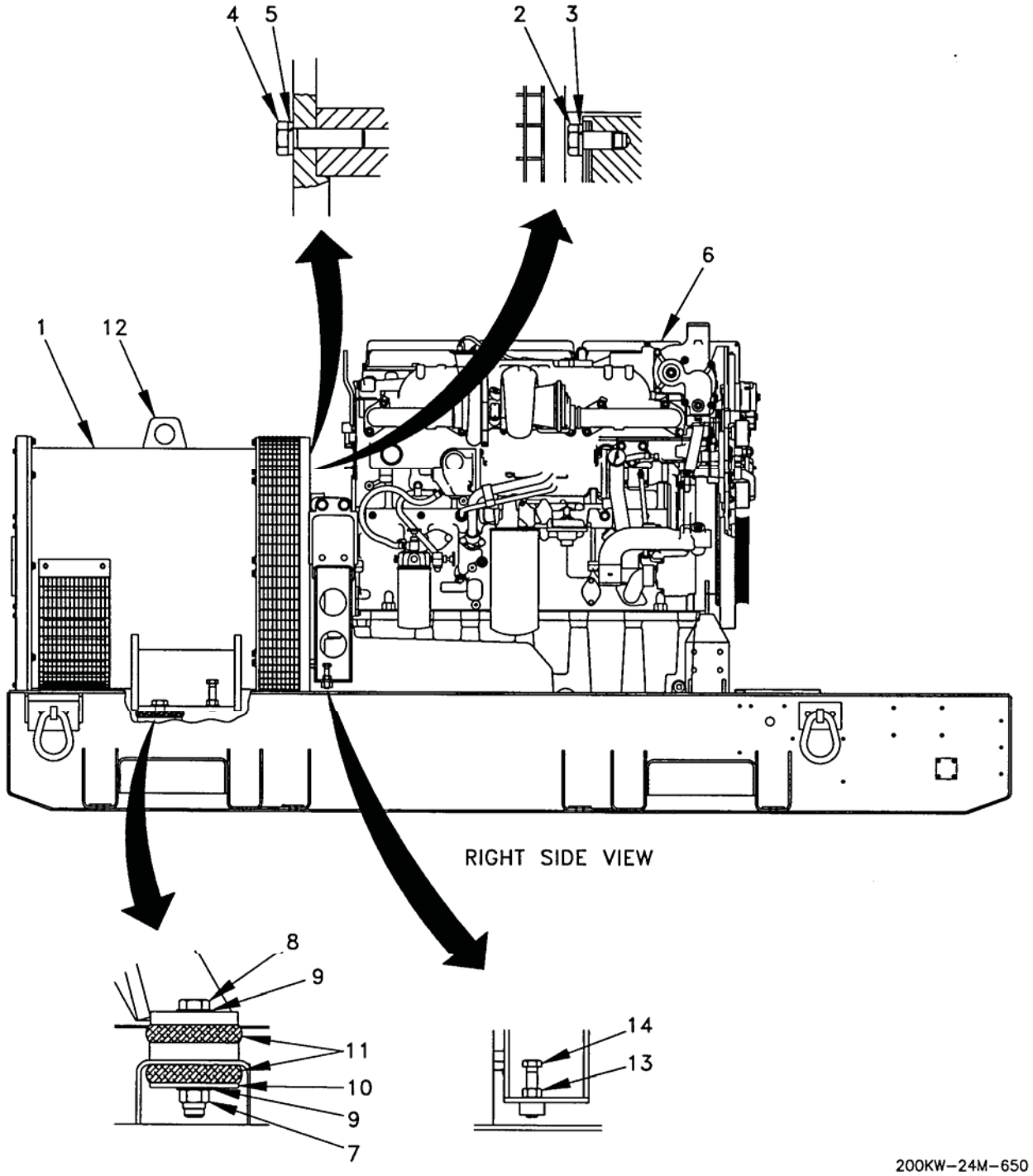

Figure 1. Generator.

INSTALLATION - Continued

5. Install 12 lockwashers (Figure 1, Item 5) and screws (Figure 1, Item 4). Torque twelve screws (Figure 1, Item 4) to 41-49 lb-ft (56-66 Nm).
6. Install eight lockwashers (Figure 1, Item 3) and screws (Figure 1, Item 2). Torque eight screws (Figure 1, Item 2) to 63-77 lb-ft (86-104 Nm).
7. Torque two screws (Figure 1, Item 8) to 216-264 lb-ft (293-358 Nm).
8. Connect wiring to generator (Figure 1, Item 1).
9. Install left rear panel assembly (WP 0039).
10. Install right rear panel assembly (WP 0038).
11. Install rear section housing assembly (WP 0035).
12. Install generator access cover assembly (WP 0033).
13. Install engine generator compartment ceiling assembly (WP 0032).
14. Install rear roof section housing assembly (WP 0031).
15. Install front roof section housing assembly (WP 0030).
16. Install right rear door assembly (latch) (WP 0028).
17. Install right rear door assembly (WP 0027).
18. Install left rear door assembly (latch) (WP 0023).
19. Install left rear door assembly (WP 0022).

END OF TASK

END OF WORK PACKAGE

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
ENGINE REPLACEMENT

INITIAL SETUP:

Tools and Special Tools

Lifting Device, 2,500 lb (1134 kg) Capacity
Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Shop Equipment, Field Maintenance, Basic (WP 0123, Item 3)

Personnel Required

Two

References

WP 0056
WP 0057
WP 0062
WP 0074
WP 0076
WP 0088
WP 0091
WP 0095
WP 0098
TM 9-6115-730-24P

Equipment Condition

Batteries removed (WP 0050)
Left front door assembly (latch) removed (WP 0021)
Left rear door assembly removed (WP 0022)
Left rear door assembly (latch) removed (WP 0023)
Load board door assembly removed (WP 0024)
Right front door assembly (latch) removed (WP 0025)

Equipment Condition (cont.)

Right front door assembly removed (WP 0026)
Right rear door assembly removed (WP 0027)
Right rear door assembly (latch) removed (WP 0028)
Access covers removed (WP 0029)
Front roof section housing assembly removed (WP 0030)
Control box assembly removed (WP 0042)
Rear roof section housing assembly removed (WP 0031)
Coolant recovery system bottle removed (WP 0064)
Surge tank removed (WP 0065)
Exhaust system removed (WP 0069)
Fan guards and shrouds removed (WP 0066)
Coolant hoses removed from engine (WP 0067)
Radiator removed (WP 0068)
Engine generator compartment ceiling assembly removed (WP 0032)
Front section housing assembly removed (WP 0034)
Left center panel assembly removed (WP 0036)
Right center panel assembly removed (WP 0037)
Right rear panel assembly removed (WP 0038)
Left rear panel assembly removed (WP 0039)
Door support assembly removed (WP 0040)
Auxiliary fuel pump assembly and solenoid valve removed (WP 0059)
Air cleaner system removed (WP 0072)
Wires from fuel level switch tagged and disconnected (WP 0056).
Hoses from winterization kit heater tagged and disconnected (WP 0091).

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

REMOVAL

1. Tag and disconnect wires from fuel level switch (WP 0056).
2. Tag and disconnect wires from alternator (WP 0074).
3. Tag and disconnect magnetic speed pickup from engine harness connector ENG-P14 (WP 0098).
4. Tag and disconnect engine harness connector ENG-P1 from ECM connector J1 (WP 0088).
5. Tag and disconnect fuel hose from engine fuel pump (WP 0057).
6. Tag and disconnect all wires and cables from starter (WP 0076).
7. Tag and disconnect winterization heater hoses from engine (if installed) (WP 0090).
8. Remove two locknuts (Figure 1, Item 1), two screws (Figure 1, Item 2), four washers (Figure 1, Item 3), and two snubbing washers (Figure 1, Item 4) and bottom engine shock mounts (Figure 1, Item 5).
9. Attach suitable lifting device with at least 2000 lb (907 kg)capacity to front lifting bracket (Figure 1, Item 6) and rear lifting bracket (Figure 1, Item 7) on engine (Figure 1, Item 8) and take slack out of lifting device.
10. Loosen two nuts (Figure 1, Item 9) and snug down two jackscrews (Figure 1, Item 10). Retighten two nuts.

REMOVAL - Continued

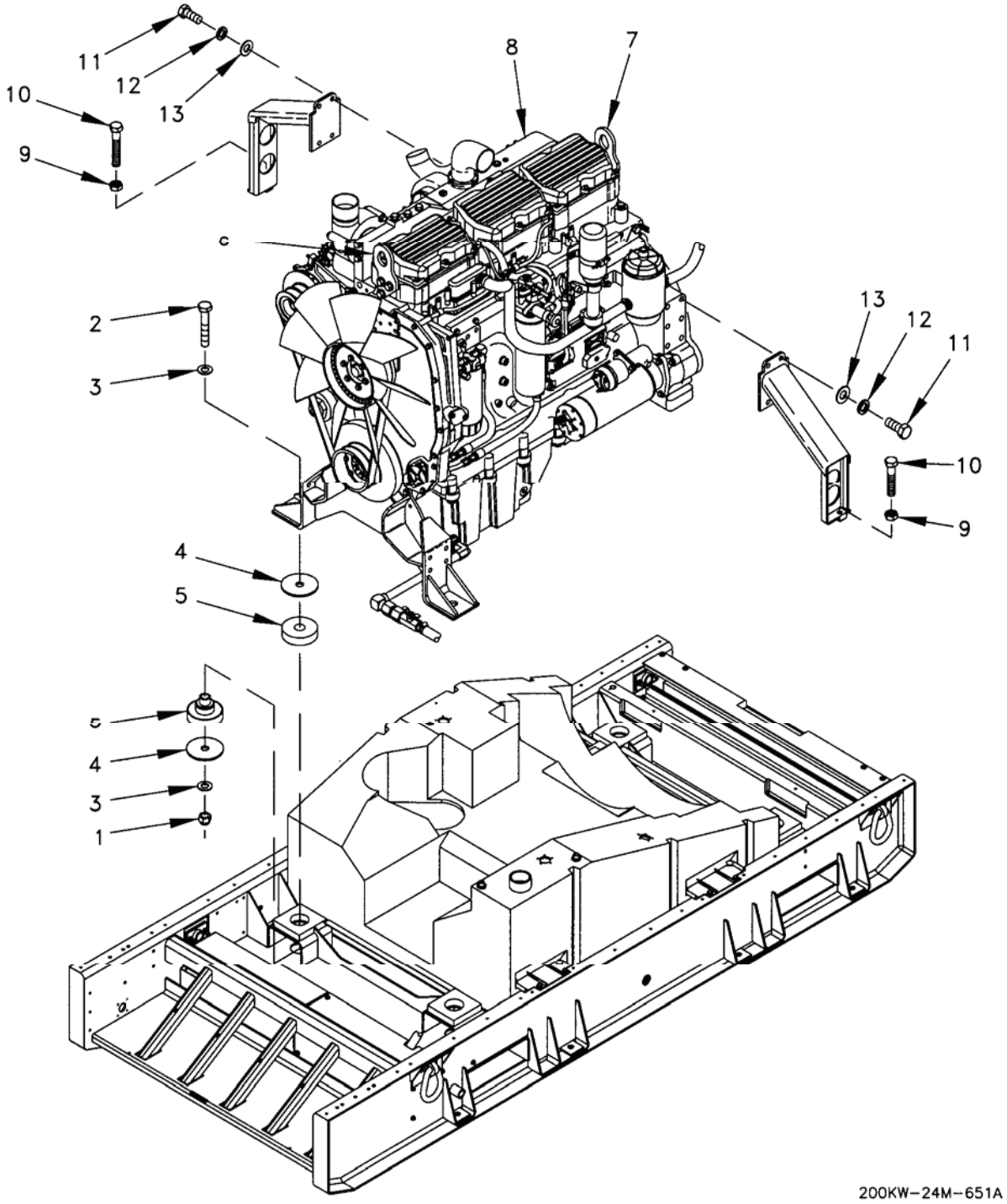

Figure 1. Engine.

REMOVAL - Continued

14. Adjust generator jackscrews to support generator (WP 0095).

15. Remove hardware connecting generator to engine and flywheel (WP 0095).

WARNING

The engine weighs more than 2000 pounds (907 kg) and requires an assistant and a lifting device (forklift, overhead lifting device) with sufficient capacity. Be careful and keep hands and arms out of the way when lifting engine out of engine generator base. Failure to comply can cause serious injury or death to personnel.

16. Carefully lift engine (Figure 1, Item 8) off engine generator base.

17. Remove two top snubbing washers (Figure 1, Item 4) and two top engine shock mounts (Figure 1, Item 5).

END OF TASK

INSTALLATION

WARNING

The engine weighs more than 2000 pounds (907 kg) and requires an assistant and a lifting device (forklift, overhead lifting device) with sufficient capacity. Be careful and keep hands and arms out of the way when lifting engine out of engine generator base. Failure to comply can cause serious injury or death to personnel.

1. Install two top engine shock mounts (Figure 1, Item 5) and snubbing washers (Figure 1, Item 4).

2. Using a suitable lifting device with at least 2000 lb (907 kg) capacity, connected to front lifting bracket (Figure 1, Item 6) and rear lifting bracket (Figure 1, Item 7), carefully lower engine (Figure 1, Item 8) onto engine generator base and top engine shock mounts assemblies. Align flywheel to generator.

3. Install two bottom engine shock mounts (Figure 1, item 5), snubbing washers (Figure 1, Item 4), four washers (Figure 1, Item 3), two screws (Figure 1, Item 2), and two locknuts (Figure 1, Item 1). Torque screws (Figure 1, Item 5) to 216-264 lb-ft (293-357 Nm).

4. Install hardware connecting generator to engine and flywheel (WP 0095).

5. Draw-up generator jackscrews (WP 0095).

6. Loosen two jackscrews (Figure 1, Item 10) and two nuts (Figure 1, Item 9). Draw-up bolts and tighten nuts.

7. Connect winterization heater hoses to engine (WP 0090, Items 11 and 13) (if previously installed).

8. Remove tags and connect wires and cables to starter (WP 0076).

9. Connect fuel hose to engine fuel pump (WP 0057).

10. Remove tag and connect engine harness connector ENG-P1 to ECM connector J1 (WP 0088).

INSTALLATION - Continued

11. Remove tag and connect magnetic speed pickup to engine harness connector ENG-P14 (WP 0098).
12. Remove tags and connect wires to alternator (WP 0074).
13. Remove tags and connect wires to fuel level switch (WP 0056).
14. Install air cleaner system (WP 0072).
15. Install radiator (WP 0068).
16. Remove tags and connect coolant hoses to engine (WP 0067).
17. Install fan guards and shrouds (WP 0066).
18. Install auxiliary fuel pump assembly and solenoid valve (WP 0059).
19. Install doors and panels (WP 0040 thru WP 0036 and WP 0034).
20. Install engine generator compartment ceiling assembly (WP 0032).
21, Install exhaust system (WP 0069).
22. Install surge tank (WP 0065).
23. Install coolant recovery system bottle (WP 0064).
24. Install rear roof section housing assembly (WP 0031).
25. Install control box assembly (WP 0042).
26. Install front roof section housing assembly (WP 0030).
27. Install door and panels (WP 0029 and WP 0021).
28. Install batteries (WP 0050).

END OF TASK

END OF WORK PACKAGE

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
ENGINE/GENERATOR BASE ASSEMBLY REPAIR

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Shop Equipment, Field Maintenance, Basic (WP 0123, Item 3)

Materials/Parts

Crocus cloth (WP 0124, Item 9)
Foam damping sheet (WP 0124, Item 10)
Foam damping sheet (WP 0124, Item 13)
Foam damping sheet (WP 0124, Item 15)
Wiping rags (WP 0124, Item 35)

Personnel Required

Two

References

MIL-DTL-53072C
TC 9-237
TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

REPAIR OR REPLACEMENT

1. Ensure generator set is fully stopped, ENGINE CONTROL switch is OFF, Battery Disconnect Switch is OFF, and DEAD CRANK SWITCH is OFF before proceeding.

REPAIR OR REPLACEMENT - Continued

NOTE

Repair of the engine/generator base assembly is limited to removal of corrosion, welding of cracks, and painting.

2. Remove attached assemblies as required to gain access to parts of engine/generator base assembly requiring repair.
3. Remove corrosion as required using crocus cloth.
4. Repair cracks in weldment by welding in accordance with TC 9-237.
5. Clean weld surface and surrounding area, pretreat, and paint in accordance with MIL-DTL-53072C, with top coat to a thickness of 1-2 mils.
6. Replace foam damping sections by using the old sections as templates to cut the new sections.
7. Install attached assemblies that were removed.

END OF TASK

END OF WORK PACKAGE

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
ENGINE ELECTRICAL SYSTEM REPAIR

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Shop Equipment, Field Maintenance, Basic (WP 0123, Item 3)

Materials/Parts

Alcohol (WP 0124, Item 4)
Breakthrough cleaning solvent (WP 0124, Item 45)
Cap and plug set (WP 0124, Item 6)
Crocus cloth (WP 0124, Item 9)
Tiedown straps (WP 0124, Item 46)
Wiping rags (WP 0124, Item 35)

Personnel Required

One

References

TM 9-6115-730-24P

Equipment Condition

Fuel drained to prevent spillage when removing fuel pressure sensor (WP 0057)
Coolant drained below the coolant temperature sensor (WP 0065)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply can cause injury to personnel and damage to equipment.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shut down generator set, and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the fuel system.

NOTE

Cut tiedown straps as required during removal. Install tiedown straps as required during installation. Table 1 identifies removal and installation steps for engine sensors.

REMOVAL

Table 1. WP 0098 Guide.

NAME	FIGURE 1 ITEM	REMOVAL STEPS	INSTALLATION STEPS	RELATED WP
Oil pressure sensor	1	1 and 2	34 and 35	
Fuel temperature sensor	4	3 and 4	32 and 33	
Fuel pressure sensor	5	5 thru 7	29 thru 31	WP 0057
Magnetic speed pickup	9	8 and 9	25 thru 28	
Coolant temperature sensor	10	10 thru 13	21 thru 24	WP 0065
Intake manifold air temperature sensor	16	14 thru 16	18 thru 20	
Turbo outlet pressure sensor	17	17 and 18	16 and 17	
Low coolant sensor	18	19 and 20	14 and 15	
Turbo inlet pressure sensor	19	21 and 22	12 and 13	
Atmospheric temperature sensor	20	23 thru 25	9 thru 11	
Camshaft speed/timing sensor (top)	23	26 and 27	7 and 8	WP 0013
Crankshaft speed/timing sensor (bottom)	27	29 and 30	1 thru 6	WP 0013

1. Tag and disconnect engine harness connector ENG-P201 from oil pressure sensor (Figure 1, Sheet 1, Item 1),
2. Remove engine oil pressure sensor (Figure 1, Sheet 1, Item 1), seal (Figure 1, Sheet 1, Item 2) and elbow (Figure 1, Sheet 1, Item 3).
3. Tag and engine harness connector ENG-P105 from fuel temperature sensor (Figure 1, Sheet 1, Item 4).
4. Remove fuel temperature sensor (Figure 1, Sheet 1, Item 4) with O-ring.
5. Drain sufficient fuel from system so fuel does not spill during removal of sensor.
6. Tag and disconnect engine harness connector ENG-P202 from fuel pressure sensor (Figure 1, Sheet 1, Item 5).

REMOVAL - Continued

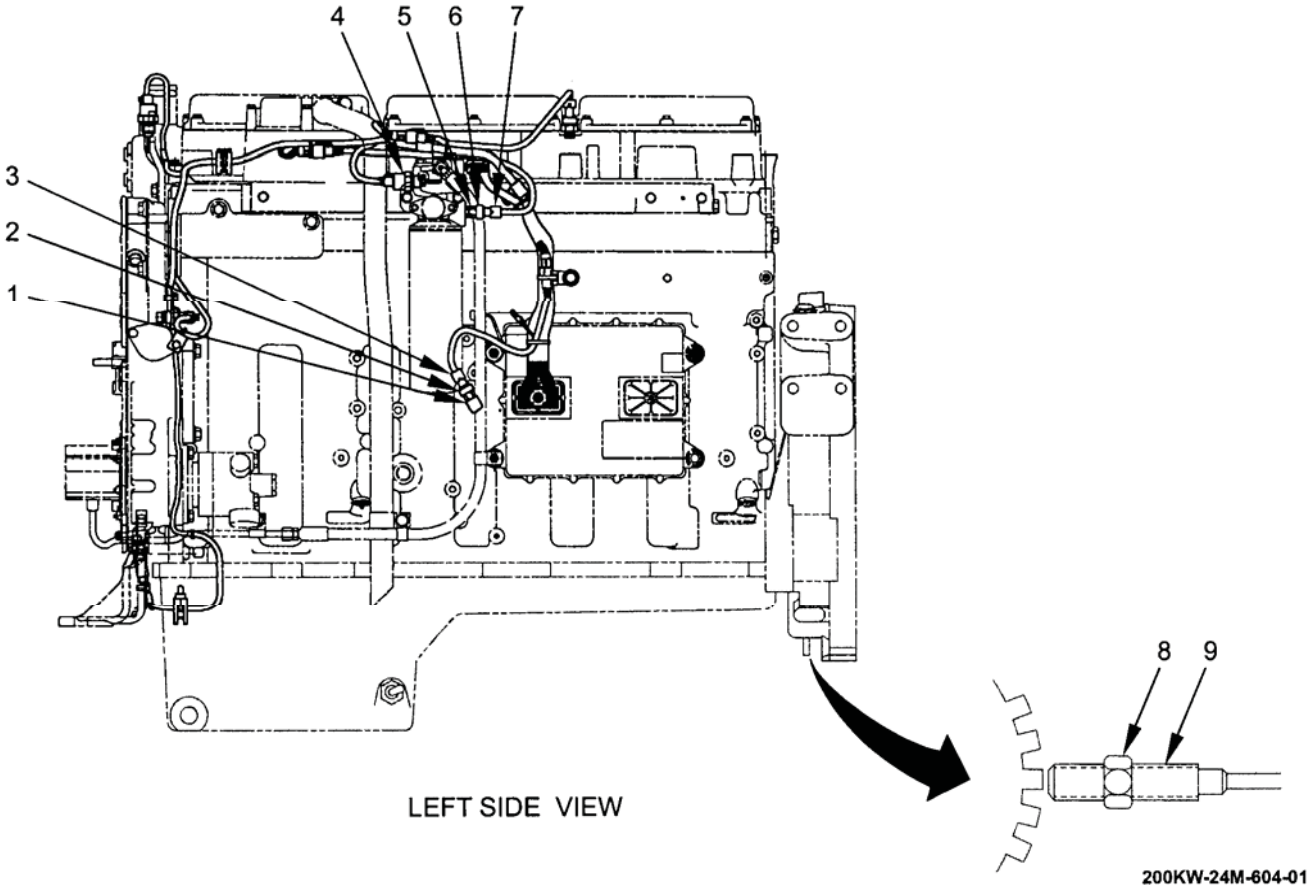

Figure 1. Engine Electrical System Repair (Sheet 1 of 3).

REMOVAL - Continued

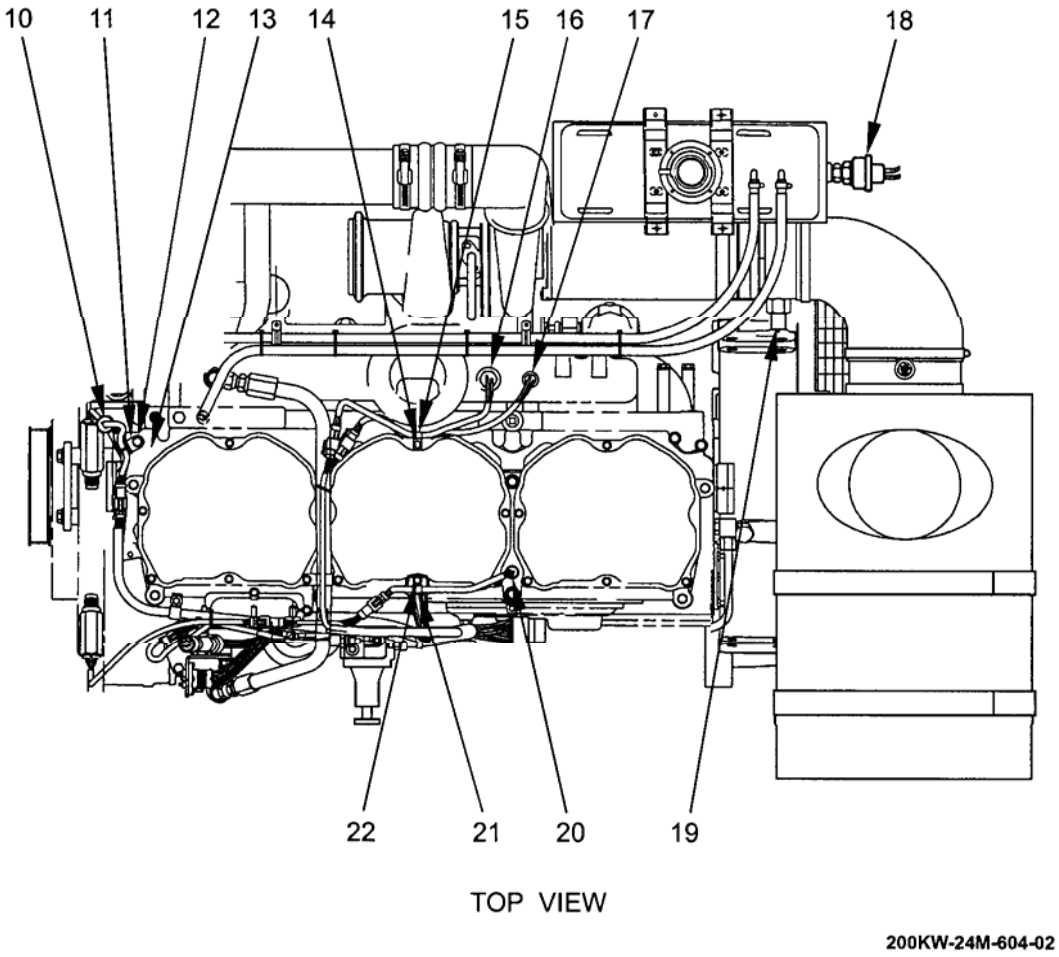

Figure 1. Engine Electrical System Repair (Sheet 2 of 3).

REMOVAL - Continued

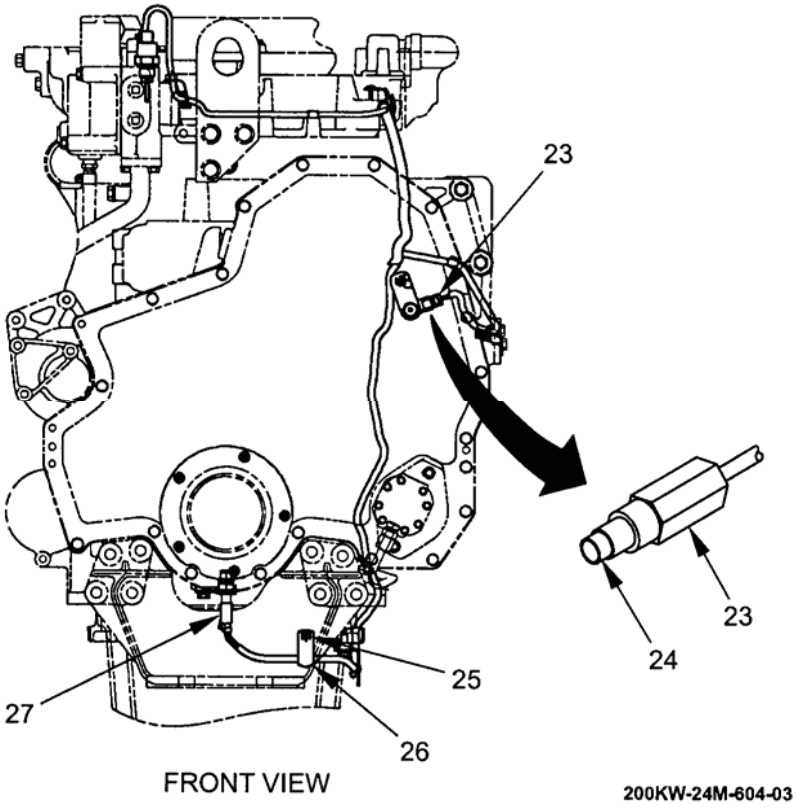

Figure 1. Engine Electrical System Repair (Sheet 3 of 3).

7. Remove fuel pressure sensor (Figure 1, Sheet 1, Item 5), seal (Figure 1, Sheet 1, Item 6), and adapter (Figure 1, Sheet 1, Item 7).

8. Tag and disconnect ECM to EMCP harness connector ENG-P14 from magnetic speed pickup (Figure 1, Sheet 1, Item 9).

9. Loosen locknut (Figure 1, Sheet 1, Item 8) and remove magnetic speed pickup (Figure 1, Sheet 1, Item 9).

10. Drain level of coolant below coolant temperature sensor (WP 0065).

11. Remove bolt (Figure 1, Sheet 2, Item 12) and clamp (Figure 1, Sheet 2, Item 11).

12. Tag and disconnect engine harness connector ENG-P100 from coolant temperature sensor (Figure 1, Sheet 2, Item 10).

13. Remove coolant temperature sensor (Figure 1, Sheet 2, Item 10) with O-ring from water outlet manifold (Figure 1, Sheet 2, Item 13).

14. Remove bolt (Figure 1, Sheet 2, Item 14) and clamp (Figure 1, Sheet 2, Item 15).

REMOVAL - Continued

15. Tag and disconnect engine harness connector ENG-P103 from intake manifold air temperature sensor (Figure 1, Sheet 2, Item 16).
16. Remove intake manifold air temperature sensor (Figure 1, Sheet 2, Item 16) with O-ring from engine.
17. Tag and disconnect engine harness connector ENG-P200 from turbo outlet pressure sensor (Figure 1, Sheet 2, Item 17).
18. Remove turbo outlet pressure sensor (Figure 1, Sheet 2, Item 17) with O-ring.
19. Tag and disconnect ECM to EMCP harness connector ENG-P16 from low coolant sensor (Figure 1, Sheet 2, Item 18).
20. Remove low coolant sensor (Figure 1, Sheet 2, Item 18) from coolant surge tank.
21. Tag and disconnect ECM to EMCP harness connector ENG-P8 from turbo inlet pressure sensor (Figure 1, Sheet 2, Item 19).
22. Remove turbo inlet pressure sensor (Figure 1, Sheet 2, Item 19) with O-ring.
23. Remove bolt (Figure 1, Sheet 2, Item 22) and clamp (Figure 1, Sheet 2, Item 21).
24. Tag and disconnect engine harness connector ENG-P203 from atmospheric pressure sensor (Figure 1, Sheet 2, Item 20).
25. Remove atmospheric pressure sensor (Figure 1, Sheet 2, Item 20) with O-ring.
26. Tag and disconnect engine harness connector ENG-P402 from camshaft timing sensor (Figure 1, Sheet 3, Item 23).
27. Remove camshaft timing sensor (Figure 1, Sheet 3, Item 23) with O-ring.
28. Remove bolt (Figure 1, Sheet 3, Item 25) and clamp (Figure 1, Sheet 3, Item 26).
29. Tag and disconnect engine harness connector ENG-P401 from crankshaft timing sensor (Figure 1, Sheet 3, Item 27).
30. Remove crankshaft timing sensor (Figure 1, Sheet 3, Item 27) with O-ring.

END OF TASK

INSTALLATION

1. Install crankshaft timing sensor (Figure 1, Sheet 3, Item 27) with O-ring.
2. Remove tag and connect engine harness connector ENG-P401 to crankshaft timing sensor (Figure 1, Sheet 3, Item 27).
3. Install bolt (Figure 1, Sheet 3, Item 25) and clamp (Figure 1, Sheet 3, Item 26).
4. Set cylinder no. 1 at top center of intake or exhaust stroke (WP 0013, SYMPTOM 8).

INSTALLATION - Continued

5. Extend slip head (Figure 1, Sheet 3, Item 24) from camshaft timing sensor (Figure 1, Sheet 3, Item 23).
6. Ensure top of gear tooth is visible through sensor opening in the housing prior to installation of sensor.
7. Install camshaft timing sensor (Figure 1, Sheet 3, Item 23) with O-ring. Torque sensor to 26-34 lb-ft (35-45 Nm).
8. Remove tag and connect engine harness connector ENG-P402 to camshaft timing sensor (Figure 1, Sheet 3, Item 23). Perform Engine Timing Sensor Calibration (WP 0013, SYMPTOM 8).
9. Install atmospheric pressure sensor (Figure 1, Sheet 2, Item 20) with O-ring.
10. Remove tag and connect engine harness connector ENG-P203 to atmospheric pressure sensor (Figure 1, Sheet 2, Item 20).
11. Install bolt (Figure 1, Sheet 2, Item 22) and clamp (Figure 1, Sheet 2, Item 21).
12. Install turbo inlet pressure sensor (Figure 1, Sheet 2, Item 19) with O-ring.
13. Remove tag and connect ECM to EMCP harness connector ENG-P8 to turbo inlet pressure sensor (Figure 1, Sheet 2, Item 19).
14. Install low coolant sensor (Figure 1, Sheet 2, Item 18) onto coolant surge tank.
15. Remove tag and connect ECM to EMCP harness connector ENG-P16 to low coolant sensor (Figure 1, Sheet 2, Item 18).
16. Install turbo outlet pressure sensor (Figure 1, Sheet 2, Item 17) with O-ring.
17. Remove tag and connect engine harness connector ENG-P200 to turbo outlet pressure sensor (Figure 1, Sheet 2, Item 17).
18. Install intake manifold air temperature sensor (Figure 1, Sheet 2, Item 16) with O-ring onto engine.
19. Remove tag and connect engine harness connector ENG-P103 to intake manifold air temperature sensor (Figure 1, Sheet 2, Item 16).
20. Install bolt (Figure 1, Sheet 2, Item 14) and clamp (Figure 1, Sheet 2, Item 15).
21. Install coolant temperature sensor (Figure 1, Sheet 2, Item 10) with O-ring onto water outlet manifold (Figure 1, Sheet 2, Item 13).
22. Remove tag and connect engine harness connector ENG-P100 to coolant temperature sensor (Figure 1, Sheet 2, Item 10)..
23. Install bolt (Figure 1, Sheet 2, Item 12) and clamp (Figure 1, Sheet 2, Item 11).
24. Refill cooling system to the correct level (WP 0065).
25. Align a ring gear tooth directly in the center of the magnetic speed pickup threaded sensor opening.

INSTALLATION - Continued

26. Screw magnetic speed pickup (Figure 1, Sheet 1, Item 9) into hole until end of sensor contacts gear tooth.
27. Back out magnetic speed pickup (Figure 1, Sheet 1, Item 9) by turning counterclockwise (CCW) 120 degrees (1/3 turn).
28. Tighten locknut (Figure 1, Sheet 1, Item 8) to 14-22 lb-ft (20-30 Nm).
29. Install fuel pressure sensor (Figure 1, Sheet 1, Item 5), seal (Figure 1, Sheet 1, Item 6), and adapter (Figure 1, Sheet 1, Item 7).
30. Remove tag and connect engine harness connector ENG-P202 to fuel pressure sensor (Figure 1, Sheet 1, Item 5).
31. Refill fuel system as required (WP 0057).
32. Install fuel temperature sensor (Figure 1, Sheet 1, Item 4) with O-ring.
33. Remove tag and connect engine harness connector ENG-P105 to fuel temperature sensor (Figure 1, Sheet 1, Item 4).
34. Install oil pressure sensor (Figure 1, Sheet 1, Item 1), seal (Figure 1, Sheet 1, Item 2), and elbow (Figure 1, Sheet 1, Item 3).
35. Remove tag and connect engine harness connector ENG-P201 from oil pressure sensor (Figure 1, Sheet 1, Item 1).

END OF TASK

END OF WORK PACKAGE

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
FAN PULLEY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Shop Equipment, Field Maintenance, Basic (WP 0123, Item 3)

Materials/Parts

Grease (WP 0124, Item 19)
Sealing compound (WP 0124, Item 41)
Seal

Personnel Required

One

References

TM 9-6115-730-24P

Equipment Condition

Engine fan removed (WP 0066)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

REMOVAL

1. Remove bolt (Figure 1, Item 1), washer (Figure 1, Item 2), plate (Figure 1, Item 3), pin (Figure 1, Item 4), and bearing (Figure 1, Item 5).

2. Remove hub (Figure 1, Item 6), spacer (Figure 1, Item 7), bearing (Figure 1, Item 8), seal (Figure 1, Item 9), spacer (Figure 1, Item 10), and pulley (Figure 1, Item 11) from spindle (Figure 1, Item 12).

REMOVAL - Continued

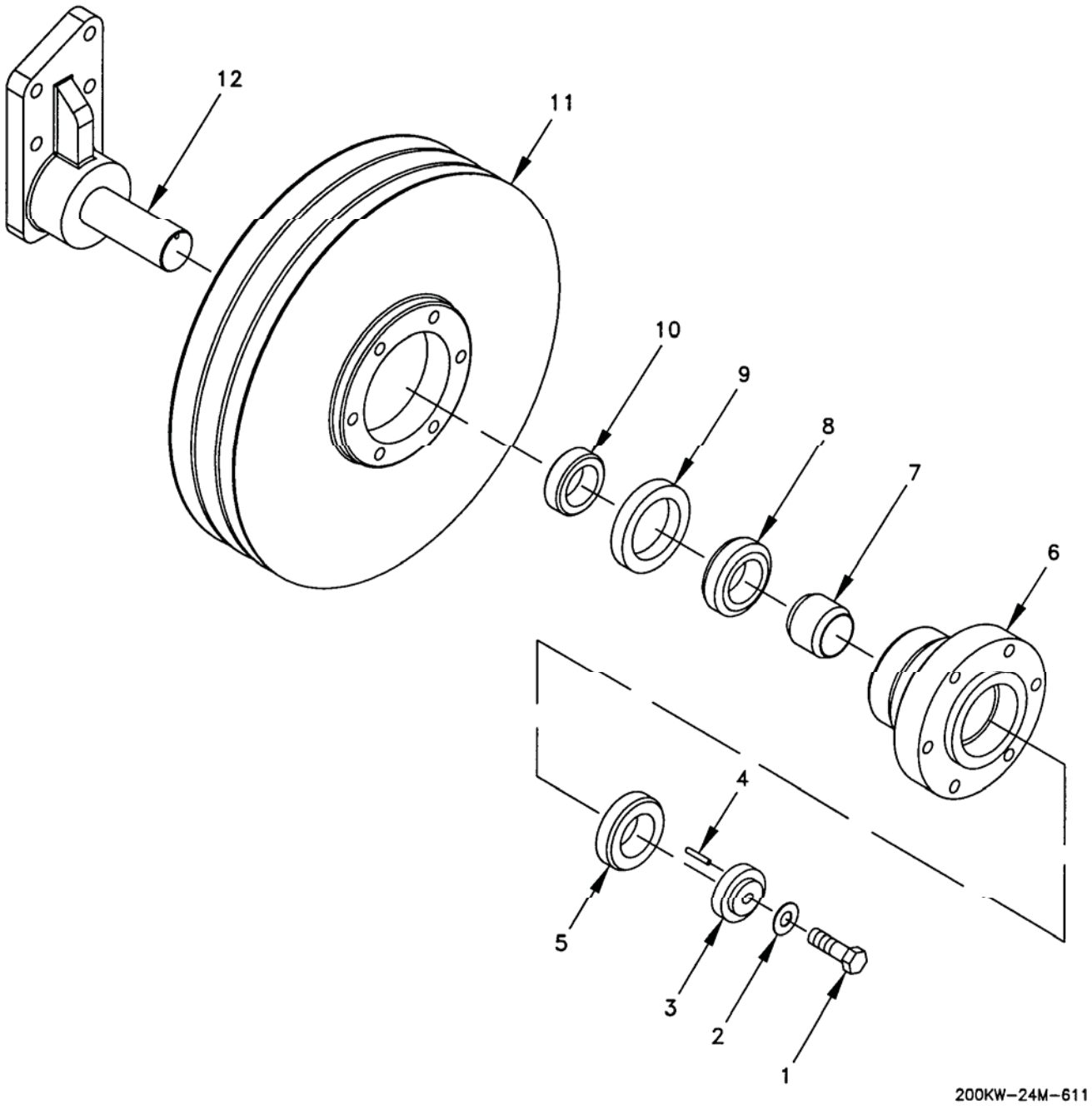

Figure 1. Fan Pulley.

END OF TASK

INSTALLATION

1. Apply light coat of grease to lips of seal (Figure 1, Item 9). Apply approximately 1/4 ounce (5 grams) of grease to each bearing (Figure 1, Item 8) and (Figure 1, Item 5). Apply approximately 1 ounce (30 grams) of grease to cavity of hub (Figure 1, Item 6).

2. Apply sealing compound to threads of bolt (Figure 1, Item 1).

3. Install pulley (Figure 1, Item 11) on spindle (Figure 1, Item 12) and install spacer (Figure 1, Item 10), seal (Figure 1, Item 9), bearing (Figure 1, Item 8), spacer (Figure 1, Item 7), and hub (Figure 1, Item 6).

4. Install pin (Figure 1, Item 4) in plate (Figure 1, Item 3) and install bearing (Figure 1, Item 5), plate (Figure 1, Item 3), washer (Figure 1, Item 2), and bolt (Figure 1, Item 1).

5. Using two bolts from fan installation (WP 0066), align holes in hub (Figure 1, Item 6) with holes in pulley (Figure 1, Item 11). Torque bolt (Figure 1, Item 1) to 74-95 lb-ft (100-130 Nm). Remove two fan bolts.

6. Install engine fan (WP 0066).

END OF TASK

END OF WORK PACKAGE

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

VALVE COVER AND BASE MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Shop Equipment, Field Maintenance, Basic (WP 0123, Item 3)

Materials/Parts

Breakthrough cleaning solvent (WP 0124, Item 45)
Gasket
Silicone sealant (WP 0124, Item 38)
Wiping rags (WP 0124, Item 35)

Personnel Required

Two

References

TM 9-6115-730-24P

Equipment condition

Remove manifold in tube (WP 0067) and elbow (WP 0116)
Remove atmospheric pressure sensor (WP 0098)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the engine.

REMOVAL

NOTE

Tag and disconnect wiring as required.

1. Remove the bolt (Figure 1, Sheet 1, Item 1) and washer (Figure 1, Sheet 1, Item 2) that holds the clamp (Figure 1, Sheet 1, Item 3) for the harness assembly to the valve cover base (Figure 1, Sheet 1, Item 4).

2. Disconnect harness assembly connector ENG-P300 (Figure 1, Sheet 1, Item 5) and clip. Loosen clamp (Figure 1, Sheet 1, Item 6) and disconnect the hose (Figure 1, Sheet 1, Item 7) from the side of the valve cover base.

3. Move the clamp and harness assembly out of the way.

4. Remove four bolts (Figure 1, Sheet 2, Item 8) and washers (Figure 1, Sheet 2, Item 9), and pull breather (Figure 1, Sheet 2, Item 10) and gasket (Figure 1, Sheet 2, Item 11) away from valve cover base (Figure 1, Sheet 2, Item 4 ref).

5. Remove 18 bolts (Figure 1, Sheet 2, Item 12), washers (Figure 1, Sheet 2, Item 13), and three valve covers (Figure 1, Sheet 2, Item 14) from valve cover base (Figure 1, Sheet 2, Item 4 ref).

6. Remove eight bolts (Figure 1, Sheet 2, Item 15), washers (Figure 1, Sheet 2, Item 16), isolators (Figure 1, Sheet 2, Item 17), sleeves (Figure 1, Sheet 2, Item 18), valve cover base (Figure 1, Sheet 1, Item 4), and gasket (Figure 1, Sheet 1, Item 19).

END OF TASK

CLEANING

1. Remove remaining gasket material from cylinder head and mating surface of valve cover base (Figure 1, Sheet 1, Item 4).

WARNING

Cleaning solvent is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with cleaning solvent. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply can cause injury or death to personnel.

2. Clean all parts thoroughly with cleaning solvent before installing.

END OF TASK

INSTALLATION

1. Apply bead of sealing compound to both sides of new gasket (Figure 1, Sheet 2, Item 19).

2. Install gasket (Figure 1, Sheet 2, Item 19), valve cover base (Figure 1, Sheet 2, Item 4 ref), eight sleeves (Figure 1, Sheet 2, Item 18), isolators (Figure 1, Sheet 2, Item 17), washers (Figure 1, Sheet 2, Item 16), and bolts (Figure 1, Sheet 2, Item 15).

INSTALLATION - Continued

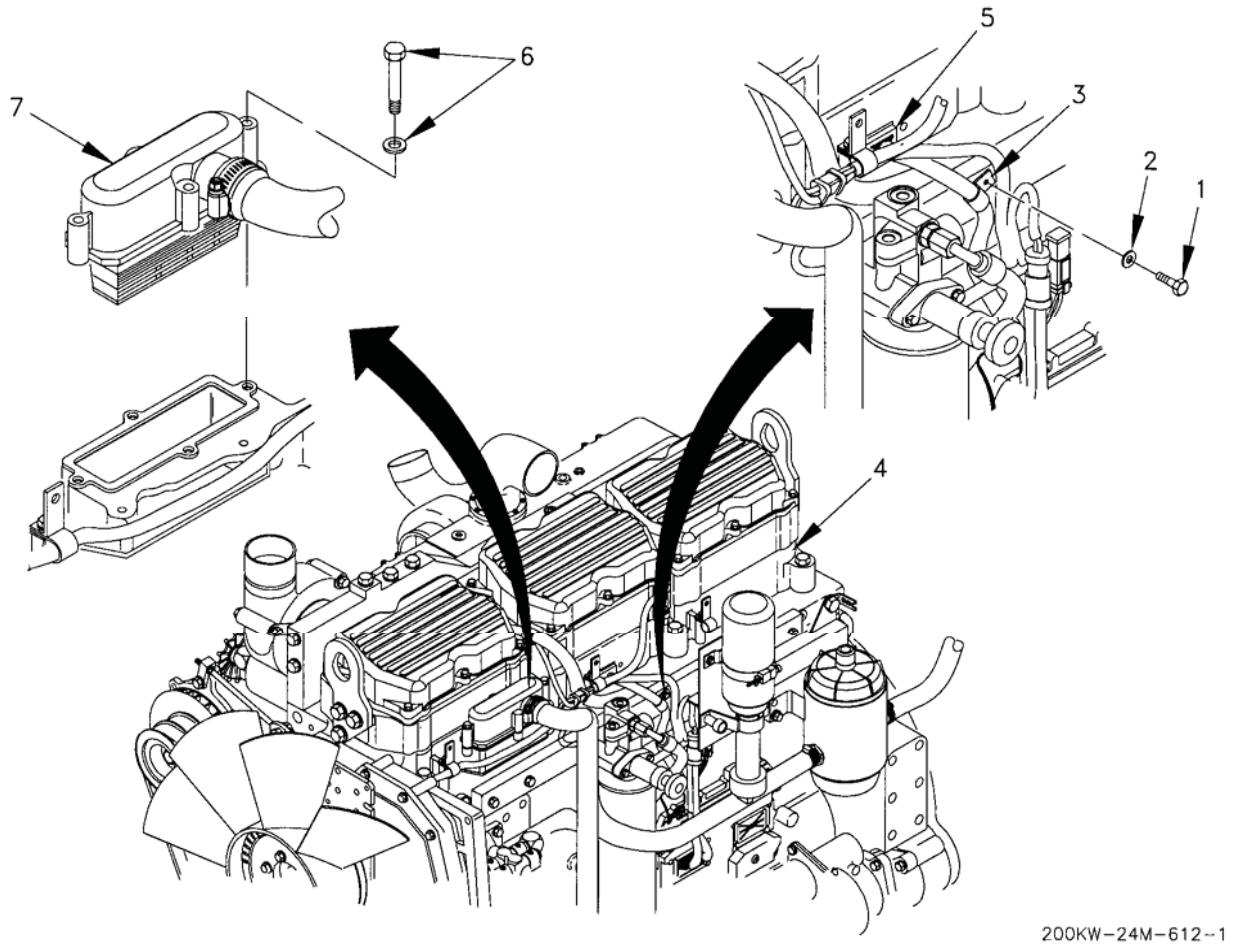

Figure 1. Valve Cover and Base (Sheet 1 of 3).

INSTALLATION - Continued

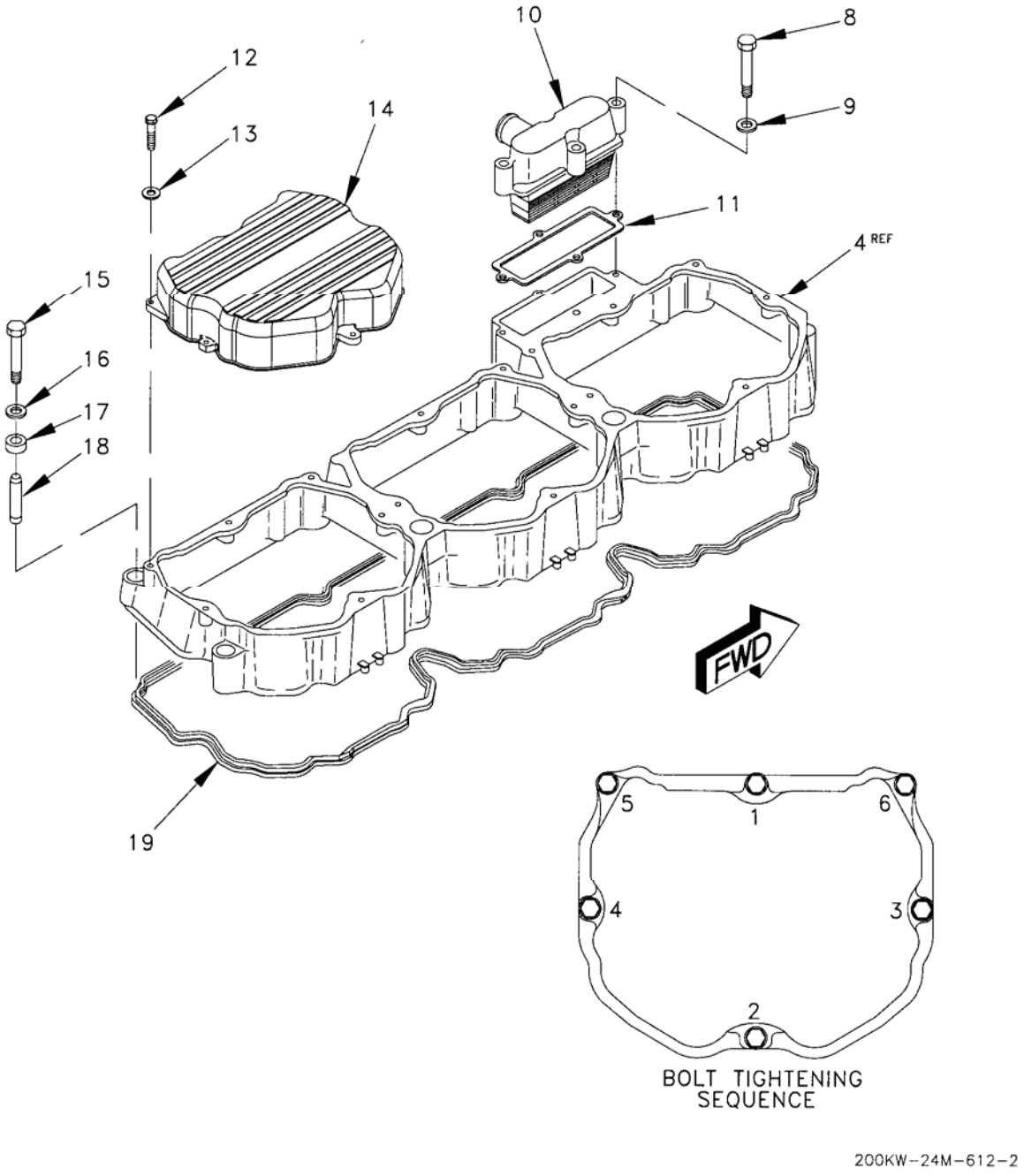

Figure 1. Valve Cover and Base (Sheet 2 of 3).

INSTALLATION - Continued

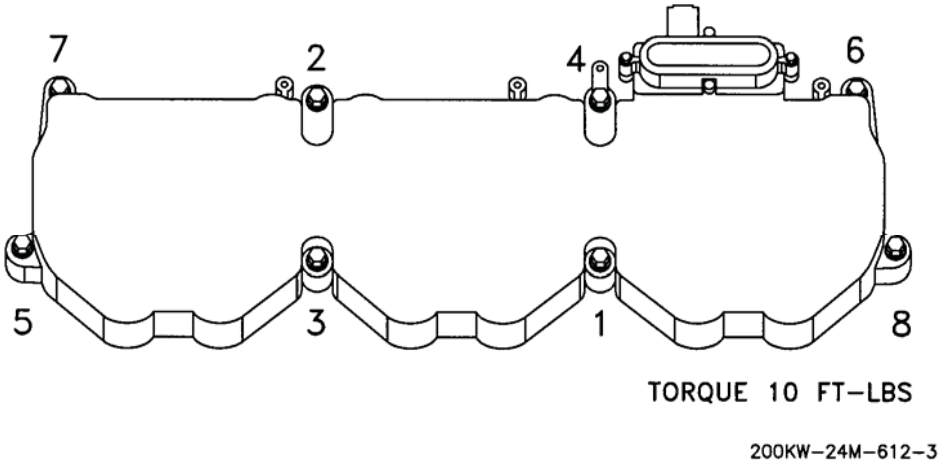

Figure 1. Valve Cover and Base (Sheet 3 of 3).

3. Using the illustrated sequence (Figure 1, Sheet 3), torque bolts (Figure 1, Sheet 2, Item 15) to 7-11 lb-ft (9-15 Nm).

4. Install three valve covers (Figure 1, Sheet 2, Item 14), 18 washers (Figure 1, Sheet 2, Item 13), and bolts (Figure 1, Sheet 2, Item 12). Using the illustrated sequence, torque bolts (Figure 1, Sheet 2, Item 12) to 7-11 lb-ft (9-15 Nm), then re-tighten, using the same sequence, to 7-11 lb-ft (9-15 Nm).

5. Install gasket (Figure 1, Sheet 2, Item 11), breather (Figure 1, Sheet 2, Item 10), four washers (Figure 1, Sheet 2, Item 9), and bolts (Figure 1, Sheet 2, Item 8).

6. Install atmospheric pressure sensor (WP 0098).

7. Install hose (Figure 1, Sheet 1, Item 7) to the side of the valve cover base and tighten clamp (Figure 1, Sheet 1, Item 6).

8. Install clamp (Figure 1, Sheet 1, Item 3) and harness assembly (Figure 1, Sheet 1, Item 5).

9. Install the bolt (Figure 1, Sheet 1, Item 1) and washer (Figure 1, Sheet 1, Item 2) that holds the clamp (Figure 1, Sheet 1, Item 3) for the harness assembly to the valve cover base (Figure 1, Sheet 1, Item 4)

END OF TASK

END OF WORK PACKAGE

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
FUEL FILTER BASE AND MANIFOLD MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Shop Equipment, Field Maintenance, Basic (WP 0123, Item 3)

Materials/Parts

Cap and plug set (WP 0124, Item 6)
O-Ring

Personnel Required

One

References

TM 9-6115-730-24P

Equipment Condition

Fuel priming pump removed (WP 0078)
Fuel filter removed (WP 0080)
Fuel pressure sensor disconnected (WP 0098)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the fuel system.

REMOVAL

1. Disconnect hose (Figure 1, Item 1), hose (Figure 1, Item 2), and remove elbow (Figure 1, Item 3) and O-ring (Figure 1, Item 4).

2. Remove two bolts (Figure 1, Item 5), washers (Figure 1, Item 6), fuel filter base (Figure 1, Item 7), and preformed packing (Figure 1, Item 8).

3. Remove five bolts (Figure 1, Item 9), washers (Figure 1, Item 10), fuel manifold (Figure 1, Item 11), and six O-rings (Figure 1, Item 12).

4. If necessary, remove plug (Figure 1, Item 13) and O-ring (Figure 1, Item 14), fitting (Figure 1, Item 15) and O-ring (Figure 1, Item 16), or fitting (Figure 1, Item 17), O-ring (Figure 1, Item 18), and cover (Figure 1, Item 19) from fuel filter base (Figure 1, Item 7).

5. If necessary, remove two plugs (Figure 1, Item 20) and O-rings (Figure 1, Item 21) or two plugs (Figure 1, Item 22) and O-rings (Figure 1, Item 23) from fuel manifold (Figure 1, Item 11).

END OF TASK

INSTALLATION

1. If necessary, install plug (Figure 1, Item 13) and O-ring (Figure 1, Item 14), fitting (Figure 1, Item 15) and O-ring (Figure 1, Item 16), or fitting (Figure 1, Item 17), O-ring (Figure 1, Item 18), and cover (Figure 1, Item 19) to fuel filter base (Figure 1, Item 7).

2. If necessary, install two plugs (Figure 1, Item 20) and O-rings (Figure 1, Item 21) or two plugs (Figure 1, Item 22) and O-rings (Figure 1, Item 23) from fuel manifold (Figure 1, Item 11).

3. Install six O-rings (Figure 1, Item 12), fuel manifold (Figure 1, Item 11), five washers (Figure 1, Item 10), and bolts (Figure 1, Item 9).

4. Install fuel filter base (Figure 1, Item 7), preformed packing (Figure 1, Item 8), two washers (Figure 1, Item 6), and bolts (Figure 1, Item 5).

5. Install elbow (Figure 1, Item 3) and O-ring (Figure 1, Item 4). Connect hose (Figure 1, Item 2). Connect hose (Figure 1, Item 1).

6. Connect fuel pressure sensor (WP 0098).

7. Install fuel filter (WP 0080).

8. Install fuel priming pump (WP 0078).

INSTALLATION - Continued

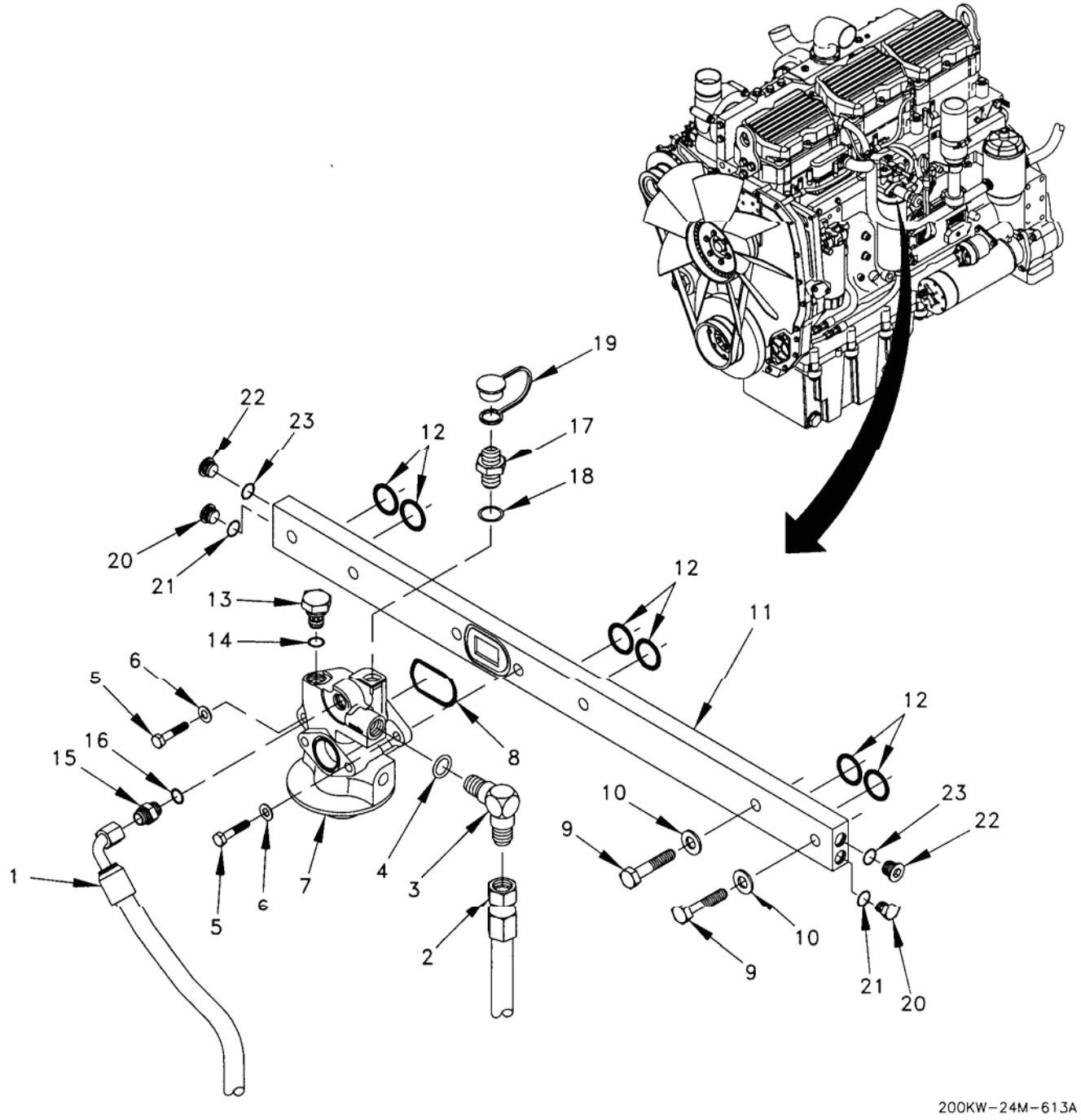

Figure 1. Fuel Filter Base and Manifold.

END OF TASK

END OF WORK PACKAGE

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
FUEL TRANSFER PUMP MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Shop Equipment, Field Maintenance, Basic (WP 0123, Item 3)

Materials/Parts

Cap and plug set (WP 0124, Item 6)
Seal
Wiping rags (WP 0124, Item 35)

Personnel Required

One

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the engine.

REMOVAL

1. At lower left front of engine, below water separator, disconnect hose (Figure 1, Item 1) and remove elbow (Figure 1, Item 2) from fuel transfer pump (Figure 1, Item 3).

2. Disconnect tube (Figure 1, Item 4) and remove elbow (Figure 1, Item 5).

REMOVAL - Continued

3. Remove two bolts (Figure 1, Item 6), washers (Figure 1, Item 7), fuel transfer pump (Figure 1, Item 3), and seal (Figure 1, Item 8).

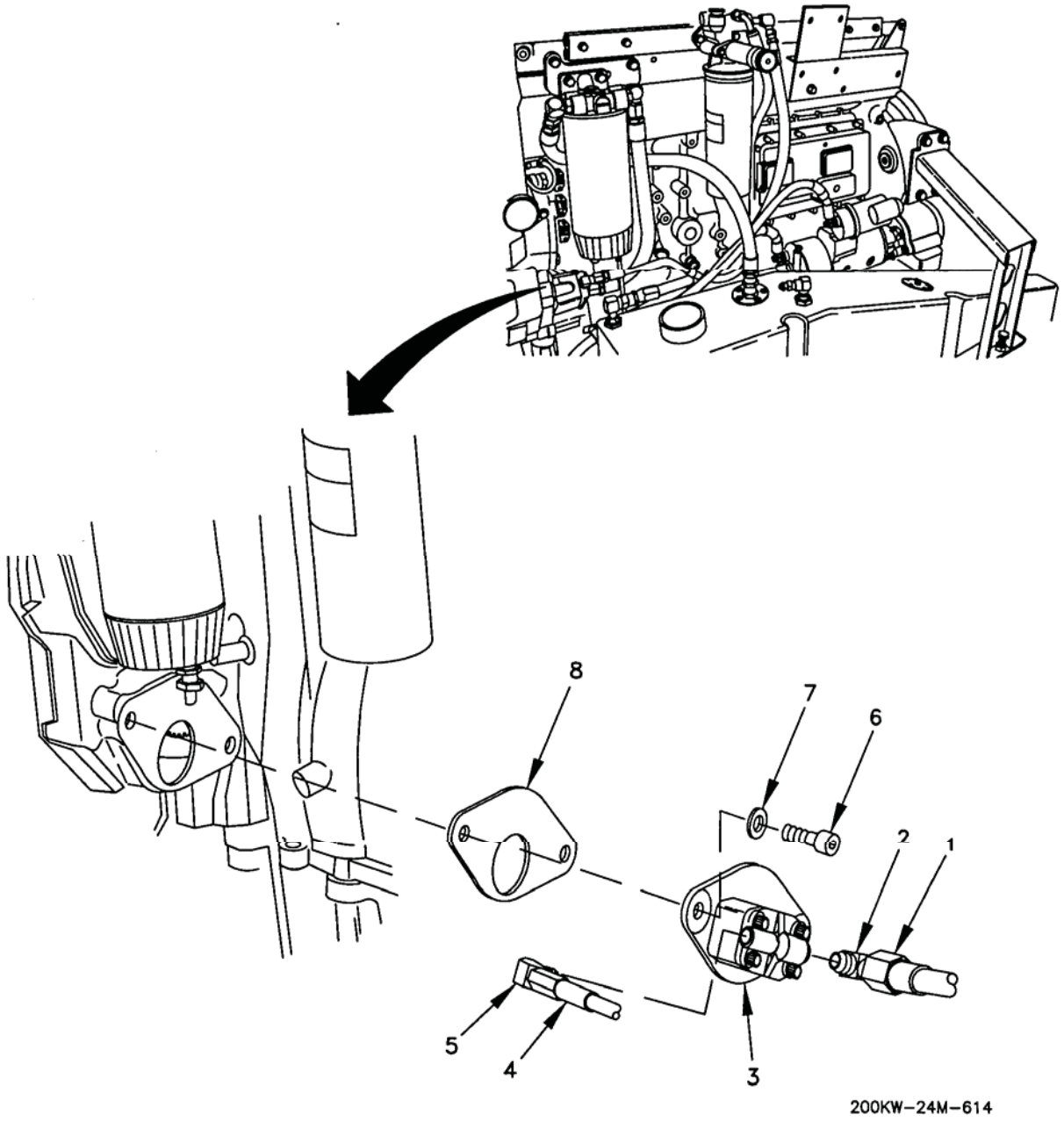

Figure 1. Fuel Transfer Pump.

END OF TASK

INSTALLATION

1. Install seal (Figure 1, Item 8), fuel transfer pump (Figure 1, Item 3), two washers (Figure 1, Item 7), and bolts (Figure 1, Item 6). Torque bolts (Figure 1, Item 4) to 34-48 lb-ft (45-65 Nm).

2. Connect elbow (Figure 1, Item 5), tube (Figure 1, Item 4), elbow (Figure 1, Item 2), and hose (Figure 1, Item 1).

END OF TASK

END OF WORK PACKAGE

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
TURBOCHARGER MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, common no. 1 (WP 0123, Item 2)
Shop Equipment, Field Maintenance, Basic (WP 0123, Item 3)

Materials/Parts

Antiseize compound (WP 0124, Item 2)
Cap and plug set (WP 0124, Item 6)
Engine oil (WP 0124, Items 23-30)
Gasket
Gasket
Gasket
Seal
Wiping rags (WP 0124, Item 35)

Personnel Required

One

References

TM 9-6115-730-24P

Equipment Condition

Manifold out tube disconnected from turbocharger (WP 0067)
Exhaust elbow disconnected from turbocharger (WP 0069)
Air vent hose disconnected from turbocharger (WP 0072)
Heat shield baffle removed (WP 0069)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the engine.

REMOVAL

1. Place a suitable container under the turbocharger (Figure 1, Item 1) to catch the oil that will flow from the oil tubes (Figure 1, Item 2) and (Figure 1, Item 3). Use wiping rags to wipe up any oil spills.

2. Remove nut (Figure 1, Item 4), two washers (Figure 1, Item 5), bolt (Figure 1, Item 6), and two clips (Figure 1, Item 7).

3. Remove two bolts (Figure 1, Item 8), washers (Figure 1, Item 9), and bosses (Figure 1, Item 10). Disconnect tube (Figure 1, Item 3) from turbocharger (Figure 1, Item 1) and remove gasket (Figure 1, Item 11).

4. Remove tube (Figure 1, Item 3), connector (Figure 1, Item 12), and seal (Figure 1, Item 13) from cylinder block.

5. Remove two bolts (Figure 1, Item 14), washers (Figure 1, Item 15), and spacers (Figure 1, Item 16). Disconnect tube (Figure 1, Item 2) and remove gasket (Figure 1, Item 17) from turbocharger (Figure 1, Item 1).

6. Remove tube (Figure 1, Item 2), seal (Figure 1, Item 18), two bolts (Figure 1, Item 19), adapter (Figure 1, Item 20), and seal (Figure 1, Item 21) from cylinder block.

7. Remove four nuts (Figure 1, Item 22), turbocharger (Figure 1, Item 1), and gasket (Figure 1, Item 23).

END OF TASK

INSTALLATION

1. Apply antiseize compound to threads of four studs (Figure 1, Item 24). Pour a small amount of engine oil into turbocharger oil inlet port (top of turbocharger) for lubrication during engine startup.

2. Install gasket (Figure 1, Item 23) and turbocharger (Figure 1, Item 1) with four nuts (Figure 1, Item 22). Torque nuts (Figure 1, Item 22) to 48-55 lb-ft (65-75 Nm).

3. Install seal (Figure 1, Item 21), adapter (Figure 1, Item 20), and two bolts (Figure 1, Item 19) on cylinder block. Apply light coat of engine oil to seal (Figure 1, Item 18) and install seal in adapter (Figure 1, Item 20). Position tube (Figure 1, Item 2) into adapter (Figure 1, Item 20).

4. Install gasket (Figure 1, Item 17) on turbocharger (Figure 1, Item 1) and install tube (Figure 1, Item 2), two spacers (Figure 1, Item 16), washers (Figure 1, Item 15), and bolts (Figure 1, Item 14).

5. Install seal (Figure 1, Item 13) and connector (Figure 1, Item 12) on cylinder block, and install tube (Figure 1, Item 3).

6. Install gasket (Figure 1, Item 11) and connect tube (Figure 1, Item 3) to turbocharger (Figure 1, Item 1) with two bosses (Figure 1, Item 10), washers (Figure 1, Item 9), and bolts (Figure 1, Item 8).

7. Install two clips (Figure 1, Item 7) with bolt (Figure 1, Item 6), two washers (Figure 1, Item 5), and nut (Figure 1, Item 4).

INSTALLATION - Continued

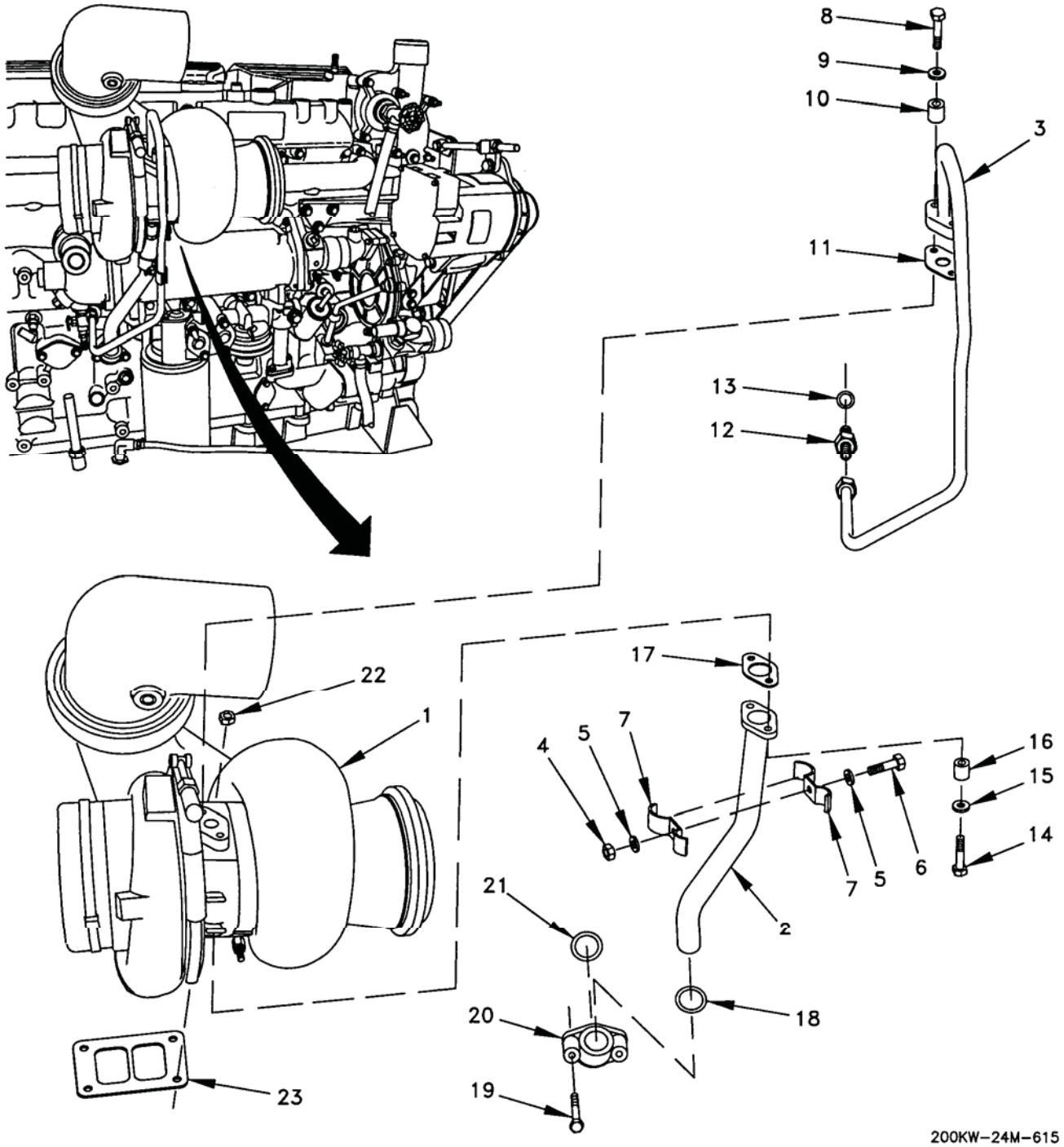

Figure 1. Turbocharger.

INSTALLATION - Continued

8. Connect air vent hose to turbocharger (WP 0072).
9. Connect exhaust elbow to turbocharger (WP 0069).
10. Connect MAN OUT tube to turbocharger (WP 0067).
11. Install heat shield baffle (WP 0069).

END OF TASK

END OF WORK PACKAGE

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

CRANKSHAFT VIBRATION DAMPER AND PULLEY MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Shop Equipment, Field Maintenance, Basic (WP 0123, Item 3)

Materials/Parts

Wiping rags (WP 0124, Item 35)

Personnel Required

One

References

TM 9-6115-730-24P

Equipment Condition

Belt tension released and belt removed (WP 0077)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the engine.

REMOVAL

1. Remove six bolts (Figure 1, Item 2) and pulley (Figure 1, Item 3).

2. Remove eight bolts (Figure 1, Item 4), washers (Figure 1, Item 5), spacer (Figure 1, Item 6), damper (Figure 1, Item 7), and adapter (Figure 1, Item 8) from crankshaft.

END OF TASK

INSTALLATION

1. Install adapter (Figure 1, Item 8), damper (Figure 1, Item 7), spacer (Figure 1, Item 6), eight washers (Figure 1, Item 5), and bolts (Figure 1, Item 4). Torque bolts (Figure 1, Item 4) to 34-48 lb-ft (45-65 Nm).

2. Install pulley (Figure 1, Item 3) and six bolts (Figure 1, Item 2). Torque bolts (Figure 1, Item 2) to 145-305 lb-ft (200-280 Nm).

3. Install belt (Figure 1, Item 1) and set belt tension (WP 0077).

INSTALLATION - Continued

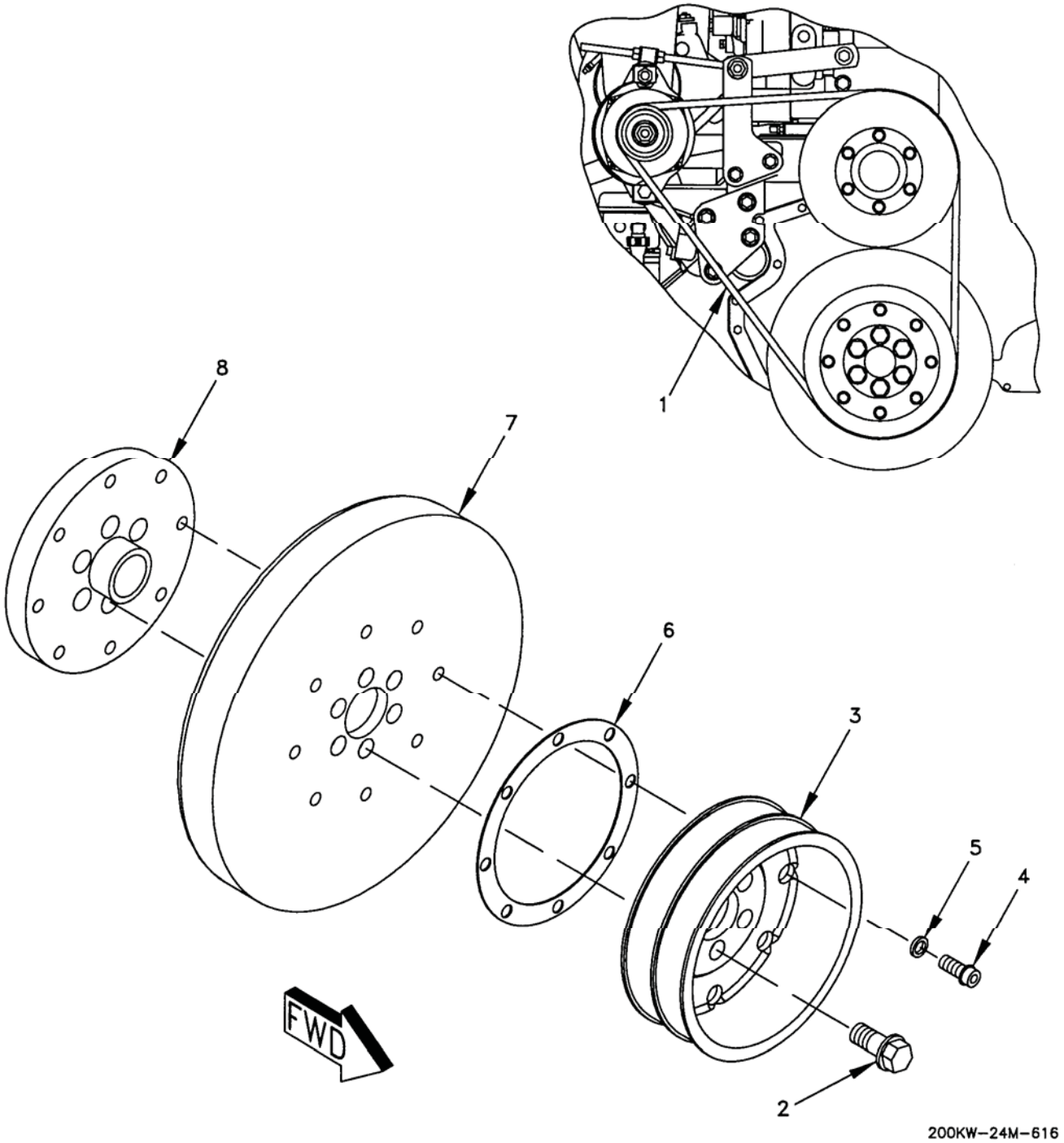

Figure 1. Crankshaft Vibration Damper and Pulley.

END OF TASK

END OF WORK PACKAGE

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

CRANKSHAFT FRONT SEAL MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Shop Equipment, Field Maintenance, Basic (WP 0123, Item 3)

Materials/Parts

Wiping rags (WP 0124, Item 35)

Personnel Required

One

References

TM 9-6115-730-24P

Equipment Condition

Crankshaft vibration damper and pulley removed (WP 0104)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the engine.

REMOVAL

1. Remove five nuts (Figure 1, Item 1) and washers (Figure 1, Item 2).
2. Remove crankshaft front seal retainer (Figure 1, Item 3) and seal (Figure 1, Item 4).

END OF TASK

INSTALLATION

NOTE

Crankshaft front seal must be installed dry.

1. Place seal (Figure 1, Item 4) on crankshaft. Push crankshaft front seal retainer (Figure 1, Item 3) into place. This will dislodge the shipping sleeve.
2. Install five washers (Figure 1, Item 2) and nuts (Figure 1, Item 1).
3. Install crankshaft vibration damper and pulley (WP 0104).

INSTALLATION - Continued

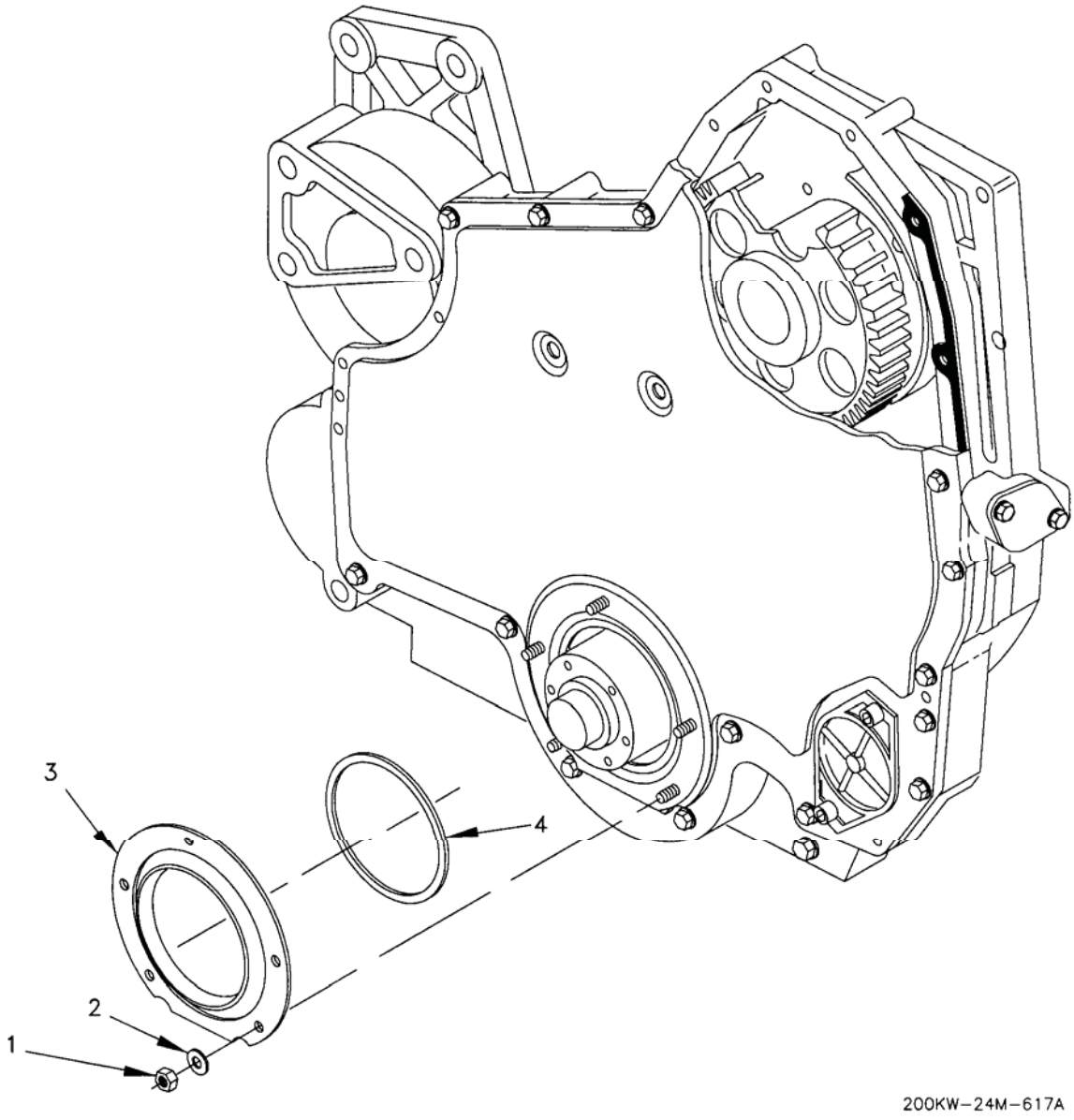

Figure 1. Crankshaft Front Seal.

END OF TASK

END OF WORK PACKAGE

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

FRONT COVER MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Shop Equipment, Field Maintenance, Basic (WP 0123, Item 3)

Materials/Parts

Gasket
Wiping rags (WP 0124, Item 35)

Personnel Required

Two

References

TM 9-6115-730-24P

Equipment Condition

Fan pulley removed (WP 0099)
Crankshaft vibration damper and pulley removed (WP 0104)
Crankshaft front seal removed (WP 0105)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the engine.

REMOVAL

1. Remove 19 bolts (Figure 1, Item 1), washers (Figure 1, Item 2), bolt (Figure 1, Item 3), and washer (Figure 1, Item 4).

2. Remove two studs (Figure 1, Item 5), washers (Figure 1, Item 6), front cover (Figure 1, Item 7), and gasket (Figure 1, Item 8).

3. If necessary, remove two bolts (Figure 1, Item 9), washers (Figure 1, Item 10), cover (Figure 1, Item 11), and gasket (Figure 1, Item 12).

END OF TASK

INSTALLATION

1. If removed, install cover (Figure 1, Item 11), gasket (Figure 1, Item 12), two washers (Figure 1, Item 10), and bolts (Figure 1, Item 9).

2. Install gasket (Figure 1, Item 8), front cover (Figure 1, Item 7), two washers (Figure 1, Item 6), and studs (Figure 1, Item 5).

3. Install washer (Figure 1, Item 4), bolt (Figure 1, Item 3), 19 washers (Figure 1, Item 2), and bolts (Figure 1, Item 1). Torque bolts (Figure 1, Item 3) and (Figure 1, Item 1) to 15-25 lb-ft (21-35 Nm).

4. Install crankshaft front seal (WP 0105).

5. Install crankshaft vibration damper and pulley (WP 0104).

6. Install fan pulley (WP 0099).

INSTALLATION - Continued

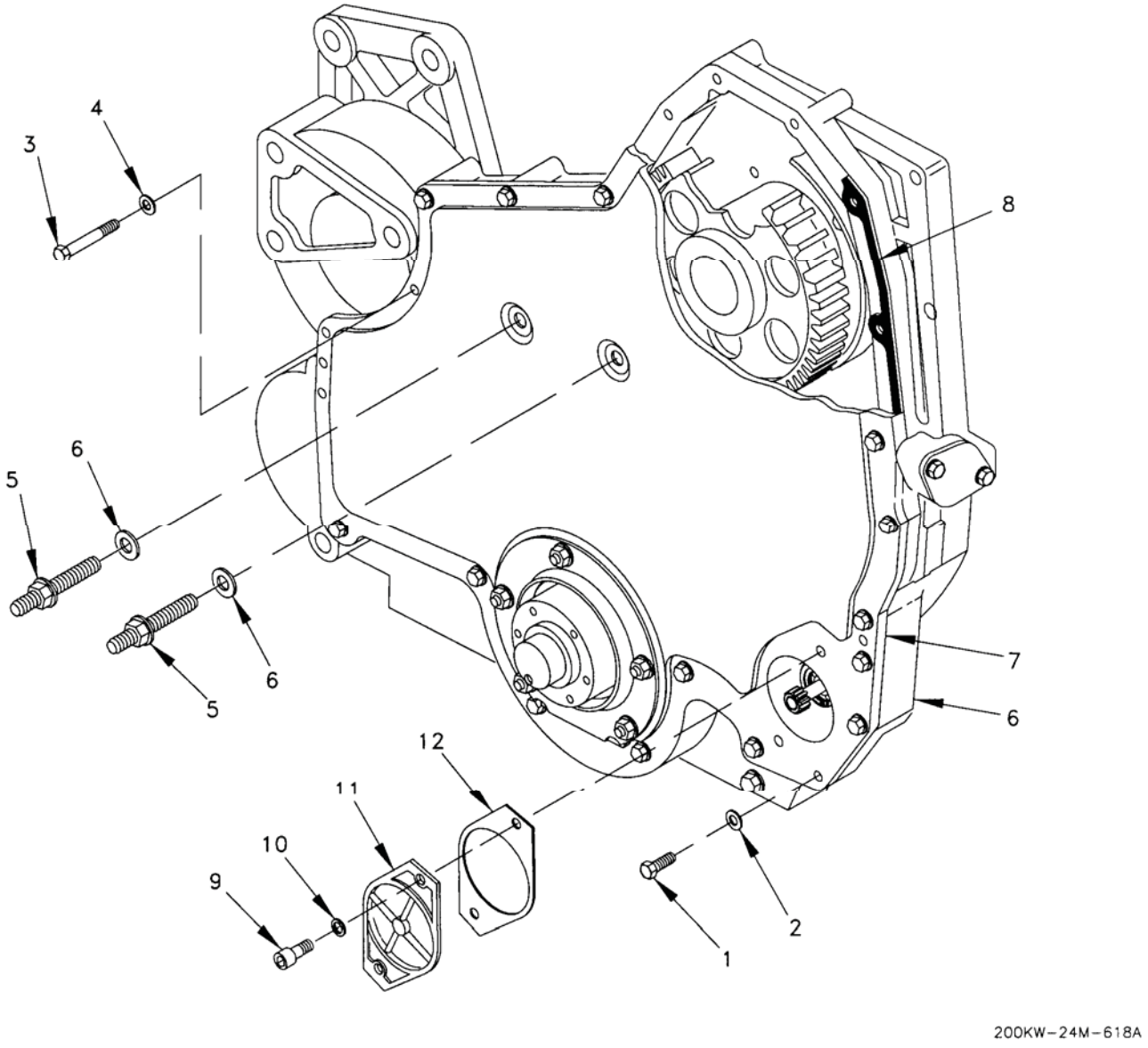

Figure 1. Front Cover.

END OF TASK

END OF WORK PACKAGE

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

OIL FILTER BASE MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Shop Equipment, Field Maintenance, Basic (WP 0123, Item 3)

Materials/Parts

Cap and plug set (WP 0124, Item 6)
Engine oil (WP 0124, Items 23-30)
O-Ring
O-Ring
O-Ring
O-Ring
O-Ring (2)
O-Ring (2)

Materials/Parts (cont.)

O-Ring
Sealing compound (WP 0124, Item 42)

Personnel Required

One

References

TM 9-6115-730-24P

Equipment Condition

Oil filter removed (WP 0079)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

WARNING

Oil filter base and housing springs are under tension and can act as projectiles when being removed. Use eye protection when removing springs. Failure to comply can cause injury to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the engine.

REMOVAL

NOTE

Cut tiedown straps as required.

For use during installation, note which two bottom bolts securing oil filter base to engine block are marked.

1. Remove six bolts (Figure 1, Item 1), washers (Figure 1, Item 2), four bolts (Figure 1, Item 3), washers (Figure 1, Item 4), and oil filter base (Figure 1, Item 5).

2. Remove O-ring (Figure 1, Item 6) and two O-rings (Figure 1, Item 7) from rear of oil filter base (Figure 1, Item 5). Remove two O-rings (Figure 1, Item 8) from top of oil filter base (Figure 1, Item 5).

END OF TASK

DISASSEMBLY

1. At rear of oil filter base (Figure 1, Item 5), remove bolt (Figure 1, Item 9), spring seat (Figure 1, Item 10), retainer spring (Figure 1, Item 11),retainer (Figure 1, Item 12), and spacer (Figure 1, Item 13).

2. Remove two bolts (Figure 1, Item 14), washers (Figure 1, Item 15), cover (Figure 1, Item 16), O-ring (Figure 1, Item 17), spring (Figure 1, Item 18), and relief valve plunger (Figure 1, Item 19).

3. Remove stud (Figure 1, Item 20), bolt (Figure 1, Item 21), two washers (Figure 1, Item 22), cover (Figure 1, Item 23), O-ring (Figure 1, Item 24), spring (Figure 1, Item 25), and bypass valve (Figure 1, Item 26).

4. Remove stud (Figure 1, Item 27), bolt (Figure 1, Item 28), two washers (Figure 1, Item 29), cover (Figure 1, Item 30), O-ring (Figure 1, Item 31), spring (Figure 1, Item 32), and relief valve plunger (Figure 1, Item 33).

5. Remove stud (Figure 1, Item 34) and stud (Figure 1, Item 35).

6. Remove plug (Figure 1, Item 36) and O-ring (Figure 1, Item 37).

DISASSEMBLY - Continued

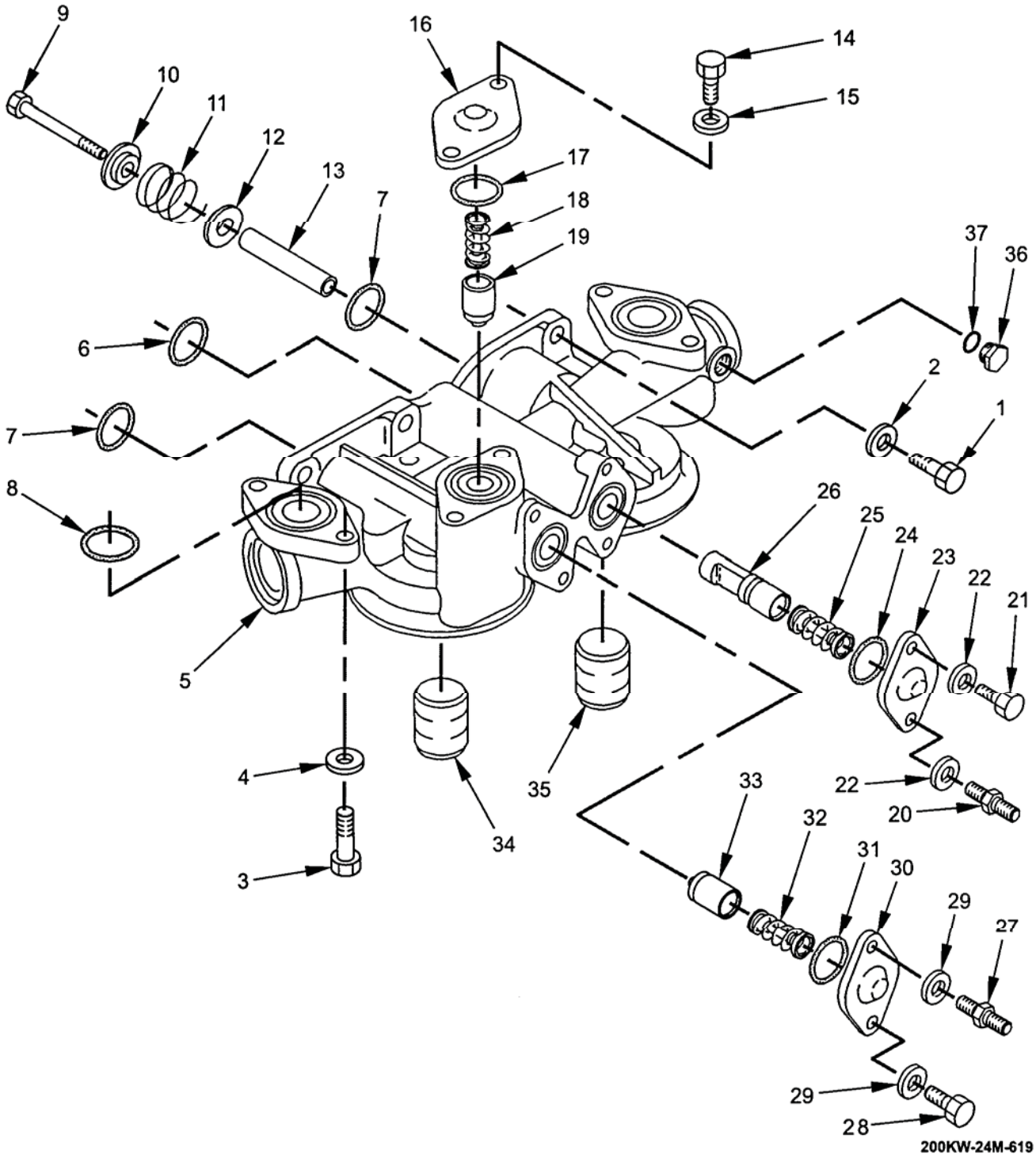

Figure 1. Oil Filter Base.

END OF TASK

ASSEMBLY

1. Install O-ring (Figure 1, Item 37) and plug (Figure 1, Item 36).
2. Install stud (Figure 1, Item 35) and torque to 37-51 lb-ft (50-70 Nm).
3. Install stud (Figure 1, Item 34) and torque to 45-55 lb-ft (61-75 Nm).
4. Install relief valve plunger (Figure 1, Item 33), spring (Figure 1, Item 32), O-ring (Figure 1, Item 31), cover (Figure 1, Item 30), two washers (Figure 1, Item 29), bolt (Figure 1, Item 28), and stud (Figure 1, Item 27).
5. Install bypass valve (Figure 1, Item 26), spring (Figure 1, Item 25), O-ring (Figure 1, Item 24), cover (Figure 1, Item 23), two washers (Figure 1, Item 22), bolt (Figure 1, Item 21), and stud (Figure 1, Item 20).
6. Install relief valve plunger (Figure 1, Item 19), spring (Figure 1, Item 18), O-ring (Figure 1, Item 17), cover (Figure 1, Item 16), two washers (Figure 1, Item 15), and bolts (Figure 1, Item 14).
7. Install spacer (Figure 1, Item 13), retainer (Figure 1, Item 12), retainer spring (Figure 1, Item 11), spring seat (Figure 1, Item 10), and bolt (Figure 1, Item 9).

END OF TASK

INSTALLATION

1. Apply light coat of engine oil to two O-rings (Figure 1, Item 8), two O-rings (Figure 1, Item 7), and O-ring (Figure 1, Item 6).
2. Install two O-rings (Figure 1, Item 8) on top of oil filter base (Figure 1, Item 5).
3. Install two O-rings (Figure 1, Item 7) and O-ring (Figure 1, Item 6).
4. Apply thread locking compound to threads of six bolts (Figure 1, Item 1) and four bolts (Figure 1, Item 3).

NOTE

Note which two bottom bolts securing oil filter base to engine block are marked and install in correct locations.

5. Position oil filter base (Figure 1, Item 5) and install six washers (Figure 1, Item 2) and bolts (Figure 1, Item 1).
6. Install four washers (Figure 1, Item 4) and bolts (Figure 1, Item 3).
7. Install oil filter (WP 0079).

END OF TASK

END OF WORK PACKAGE

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

OIL COOLER MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Shop Equipment, Field Maintenance, Basic (WP 0123, Item 3)

Materials/Parts

Cap and plug set (WP 0124, Item 6)
O-Ring
O-Ring
O-Ring (2)

Personnel Required

One

References

TM 9-6115-730-24P

Equipment Condition

Turbocharger oil lines removed from in front of oil cooler (WP 0103)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the engine.

REMOVAL

1. Remove two bolts (Figure 1, Item 1), one stud (Figure 1, Item 2), and three washers (Figure 1, Item 3).
2. Remove elbow (Figure 1, Item 4), coupling (Figure 1, Item 5), two O-rings (Figure 1, Item 6), and O-ring (Figure 1, Item 7).
3. Remove three bolts (Figure 1, Item 8) and washers (Figure 1, Item 9).
4. Remove three bolts (Figure 1, Item 10), washers (Figure 1, Item 11), oil cooler (Figure 1, Item 12), and three O-rings (Figure 1, Item 13).
5. Loosen two hose clamps (Figure 1, Item 14) and remove bonnet (Figure 1, Item 15), hose (Figure 1, Item 16) from elbow (Figure 1, Item 17).
6. If necessary, remove two screws (Figure 1, Item 18), washers (Figure 1, Item 19), elbow (Figure 1, Item 17), and gasket (Figure 1, Item 20).
7. If necessary, remove three plugs (Figure 1, Item 21) from elbow (Figure 1, Item 17).
8. If necessary, remove plug (Figure 1, Item 22) from bonnet (Figure 1, Item 15).
9. If necessary, remove plug (Figure 1, Item 23) and O-ring (Figure 1, Item 24) from elbow (Figure 1, Item 17).

END OF TASK

CLEANING

1. Clean cooler core with brush.
2. Clean tube bundles with rod of suitable diameter.
3. Inspect oil cooler for cracks or leaks.

END OF TASK

INSTALLATION

1. If necessary, install plug (Figure 1, Item 23) and O-ring (Figure 1, Item 24) to elbow (Figure 1, Item 17).
2. If necessary, install plug (Figure 1, Item 22) to bonnet (Figure 1, Item 15).
3. If necessary, install three plugs (Figure 1, Item 21) to elbow (Figure 1, Item 17).

INSTALLATION - Continued

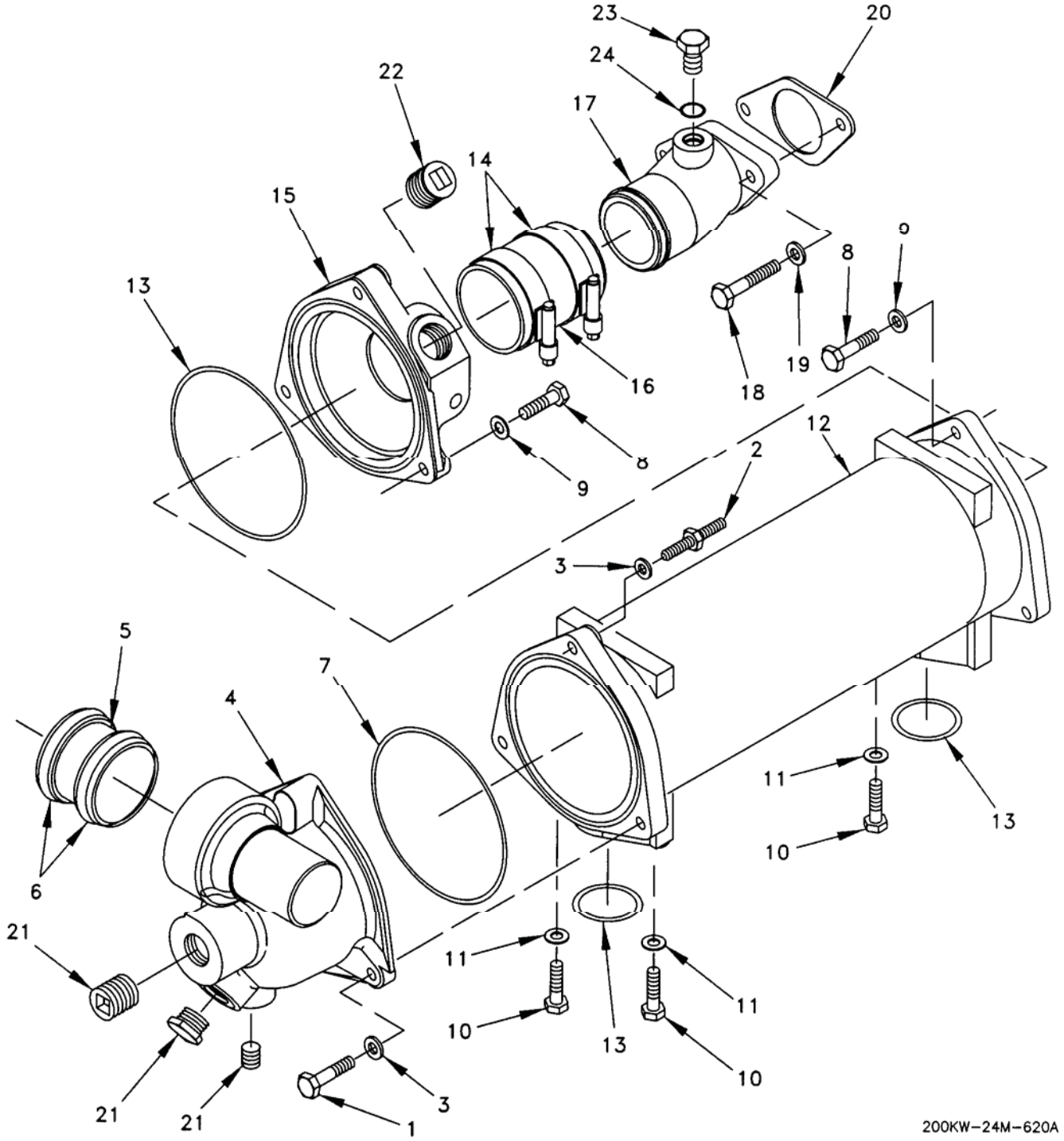

Figure 1. Oil Cooler.

INSTALLATION - Continued

4. If necessary, install two screws (Figure 1, Item 18), washers (Figure 1, Item 19), elbow (Figure 1, Item 17), and gasket (Figure 1, Item 20).

5. Install hose (Figure 1, Item 16) and bonnet (Figure 1, Item 15) on elbow (Figure 1, Item 17). Do not tighten hose clamps (Figure 1, Item 14).

6. Install three O-rings (Figure 1, Item 13), oil cooler (Figure 1, Item 12), three washers (Figure 1, Item 11), and bolts (Figure 1, Item 10).

7. Install three washers (Figure 1, Item 9) and bolts (Figure 1, Item 8).

8. Install O-ring (Figure 1, Item 7), two O-rings (Figure 1, Item 6), coupling (Figure 1, Item 5), and elbow (Figure 1, Item 4).

9. Install three washers (Figure 1, Item 3), one stud (Figure 1, Item 2), and two bolts (Figure 1, Item 1).

10. Tighten two hose clamps (Figure 1, Item 14).

11. Install turbocharger oil lines (WP 0103).

END OF TASK

END OF WORK PACKAGE

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
OIL PUMP MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Shop Equipment, Field Maintenance, Basic (WP 0123, Item 3)

Materials/Parts

Cap and plug set (WP 0124, Item 6)
Engine oil (WP 0124, Items 23-30)

Personnel Required

One

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the engine.

REMOVAL

1. Remove two bolts (Figure 1, Item 1) and washers (Figure 1, Item 2) holding tube (Figure 1, Item 3) to elbow (Figure 1, Item 4).

2. Remove two bolts (Figure 1, Item 5) and washers (Figure 1, Item 6) holding oil pump (Figure 1, Item 7) to engine block.

REMOVAL - Continued

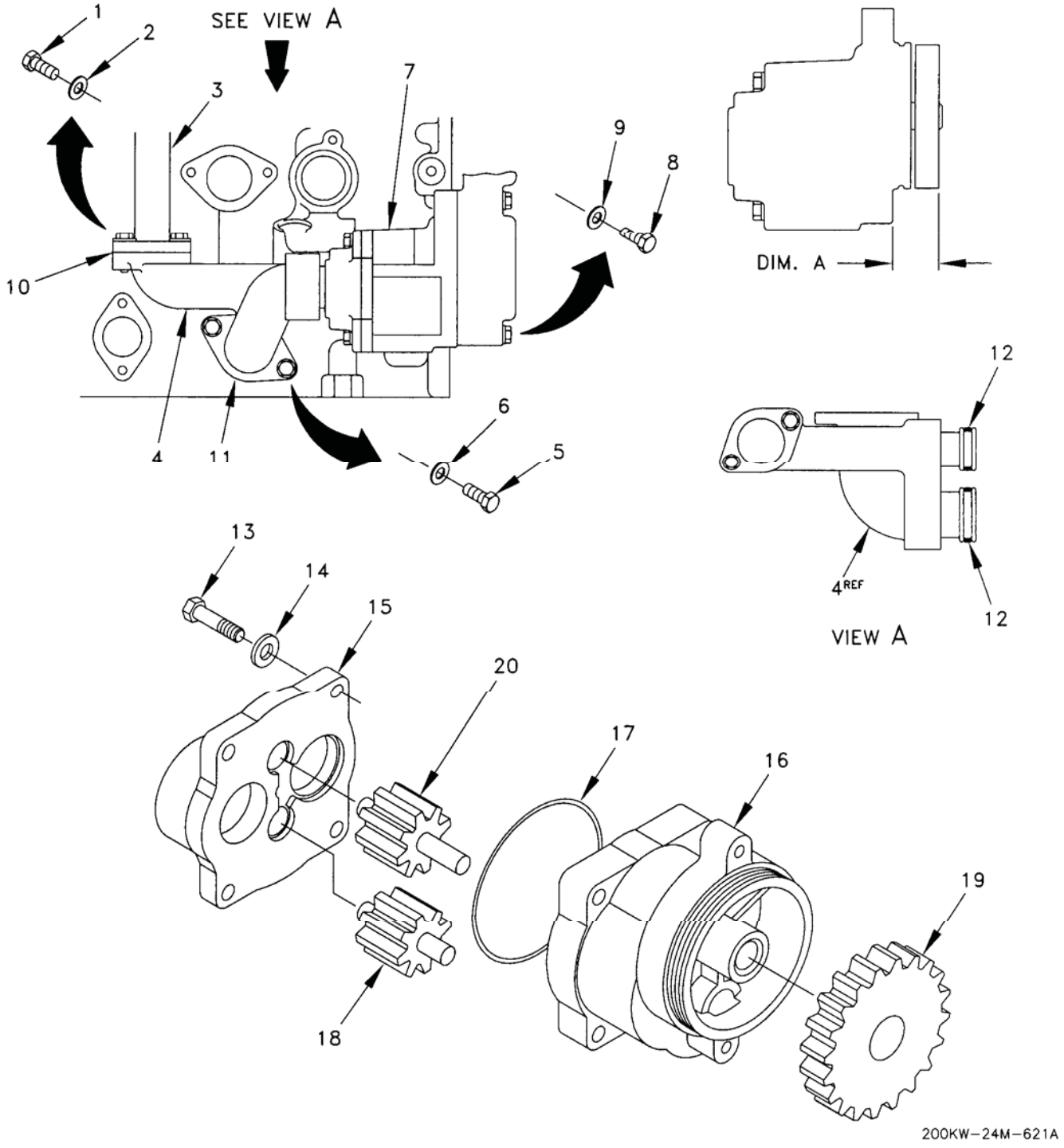

Figure 1. Oil Pump.

REMOVAL - Continued

3. Remove two bolts (Figure 1, Item 8) and washers (Figure 1, Item 9) holding oil pump (Figure 1, Item 7) to front housing.

4. Remove oil pump (Figure 1, Item 7), O-ring (Figure 1, Item 10), and O-ring (Figure 1, Item 11).

END OF TASK

DISASSEMBLY

1. Remove elbow (Figure 1, Item 4) and two O-rings (Figure 1, Item 12) from oil pump (Figure 1, Item 7).

2. Remove four bolts (Figure 1, Item 13), washers (Figure 1, Item 14), and cover (Figure 1, Item 15) from pump housing (Figure 1, Item 16).

3. Remove O-ring (Figure 1, Item 17), idler gear (Figure 1, Item 18), and gear (Figure 1, Item 19) from cover (Figure 1, Item 15).

4. Remove drive shaft (Figure 1, Item 20) from pump housing (Figure 1, Item 16).

END OF TASK

INSPECTION OF INSTALLED ITEMS

1. Inspect two shaft bores in pump body for diameter of 0.710-0.711 in. (18.04-18.06 mm).

2. Inspect two shaft bores in pump body for depth of 1.973-1.974 in. (50.11-50.15 mm).

3. Inspect shaft of idler gear (Figure 1, Item 18) and drive shaft (Figure 1, Item 20) for diameter of 0.7084-0.7088 in. (17.995-18.005 mm).

END OF TASK

ASSEMBLY

1. Heat drive shaft (Figure 1, Item 20), idler gear (Figure 1, Item 18), and gear (Figure 1, Item 19) to a maximum of 600 degrees F (316 degrees C).

WARNING

Wear heat resistant gloves and avoid contacting hot metal surfaces with your hands after oil pump gears or shaft have been heated. Wear additional protective clothing as required. Failure to comply can cause injury to personnel.

NOTE

Lubricate all internal parts, including O-rings, with engine oil before installation.

2. Install drive shaft (Figure 1, Item 20) in pump housing (Figure 1, Item 16).

3. Install gear (Figure 1, Item 19) on end of drive shaft (Figure 1, Item 20). Make sure front face of gear is 1.138-1.177 in. (28.90-29.90 mm) from step face on pump housing (dimension A).

ASSEMBLY - Continued

4. Install idler gear (Figure 1, Item 18) in pump housing.

5. Install O-ring (Figure 1, Item 17) and cover (Figure 1, Item 15) on pump housing (Figure 1, Item 16) and secure with four washers (Figure 1, Item 14) and bolts (Figure 1, Item 13).

6. Check that oil pump gear (Figure 1, Item 19) rotates freely by hand.

END OF TASK

INSTALLATION

1. Install two O-rings (Figure 1, Item 12) and elbow (Figure 1, Item 4) on oil pump (Figure 1, Item 7).

2. Install O-ring (Figure 1, Item 11), O-ring (Figure 1, Item 10), oil pump (Figure 1, Item 7) and two washers (Figure 1, Item 9) and bolts (Figure 1, Item 8).

3. Install two washers (Figure 1, Item 6) and bolts (Figure 1, Item 5).

4. Install two washers (Figure 1, Item 2) and bolts (Figure 1, Item 1).

END OF TASK

END OF WORK PACKAGE

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
WATER PUMP MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Shop Equipment, Field Maintenance, Basic (WP 0123, Item 3)

Personnel Required

One

References

TM 9-65115-730-24P

Equipment Condition

Alternator removed (WP 0074)
Belt tensioner removed (WP 0077)
Oil cooler removed (WP 0108)
Lower right fan guard removed (WP 0066)
Water pump coolant hoses removed (WP 0067)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the engine.

REMOVAL

1. Remove two bolts (Figure 1, Item 1) and washers (Figure 1, Item 2) from tube (Figure 1, Item 3).
2. Remove bolt (Figure 1, Item 4) and washer (Figure 1, Item 5).
3. Remove two bolts (Figure 1, Item 6) and washers (Figure 1, Item 7).

REMOVAL - Continued

4. Remove two bolts (Figure 1, Item 8) and washers (Figure 1, Item 9) from front cover.
5. Remove water pump (Figure 1, Item 10) and tube (Figure 1, Item 3).
6. Remove tube (Figure 1, Item 3) and flange gasket.

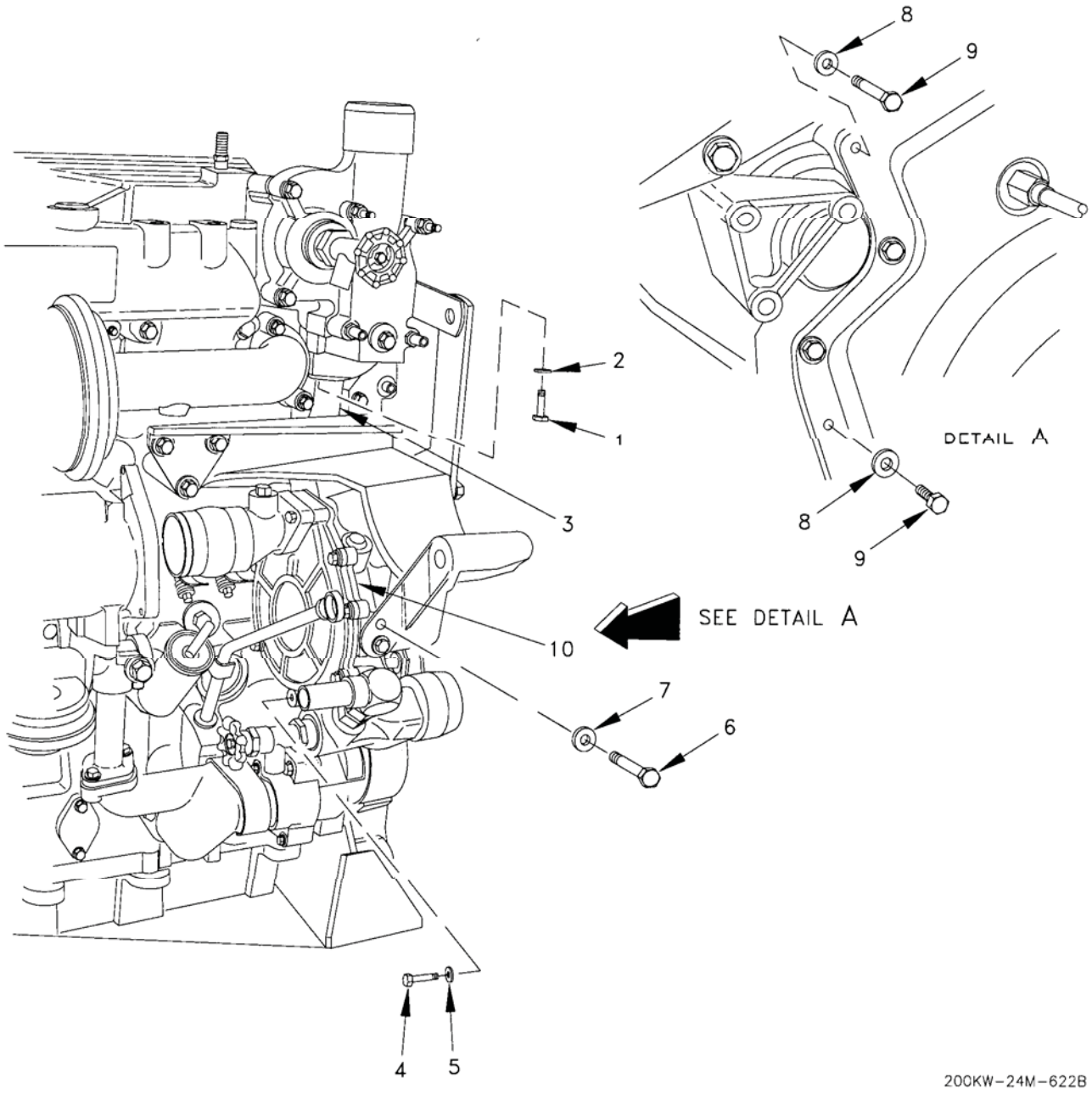

Figure 1. Water Pump.

END OF TASK

INSTALLATION

1. Install tube (Figure 1, Item 3) in water pump (Figure 1, Item 10), position water pump, and install two washers (Figure 1, Item 9) and bolts (Figure 1, Item 8). Torque bolts (Figure 1, Item 8) to 16-26 lb-ft (21-35 Nm).
2. Install flange gasket between tube (Figure 1, Item 3) and water temperature regulator housing. Install two washers (Figure 1, Item 2) and bolts (Figure 1, Item 1). Torque bolts (Figure 1, Item 1) to 16-26 lb-ft (21-35 Nm).
3. Install two washers (Figure 1, Item 7) and bolts (Figure 1, Item 6).
4. Install washer (Figure 1, Item 5) and bolt (Figure 1, Item 4).
5. Install lower radiator hose (WP 0067).
6. Install hose (WP 0067).
7. Install lower right fan guard (WP 0066).
8. Install oil cooler (WP 0108).
9. Install belt tensioner (WP 0077).
10. Install alternator (WP 0074).

END OF TASK

END OF WORK PACKAGE

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
FLYWHEEL MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Shop Equipment, Field Maintenance, Basic (WP 0123, Item 3)

Materials/Parts

Thread locking compound (WP 0124, Item 42)

Personnel Required

Two

References

TM 9-6115-730-24P

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

WARNING

Flywheel weighs more than 125 pounds (57 kg) and requires a two-person lift. Lifting flywheel can cause back strain. Ensure proper lifting techniques are used when lifting flywheel. Failure to comply can cause injury to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the engine.

REMOVAL

1. Attach suitable lifting device to flywheel (Figure 1, Item 1).
2. Remove eight bolts (Figure 1, Item 2), washers (Figure 1, Item 3), and slide flywheel (Figure 1, Item 1) off guide pins.
3. If necessary, remove ring gear (Figure 1, Item 4) with a hammer and punch.

END OF TASK

INSTALLATION

WARNING

Wear heat resistant gloves and avoid contacting hot metal surfaces with your hands after flywheel ring gear has been heated. Wear additional protective clothing as required. Failure to comply can cause injury to personnel.

1. If removed, heat ring gear to a maximum of 600 degrees F (315 degrees C). Install ring gear (Figure 1, Item 4) on flywheel (Figure 1, Item 1) with part number toward crankshaft, using a soft hammer.
2. Place flywheel (Figure 1, Item 1) in original position on crankshaft and align arrows on crankshaft and flywheel.
3. Apply thread locking compound to threads of eight bolts (Figure 1, Item 2). Install eight washers (Figure 1, Item 3) and bolts (Figure 1, Item 2). Torque bolts (Figure 1, Item 2) evenly to 133-251 lb-ft (260-340 Nm).

INSTALLATION - Continued

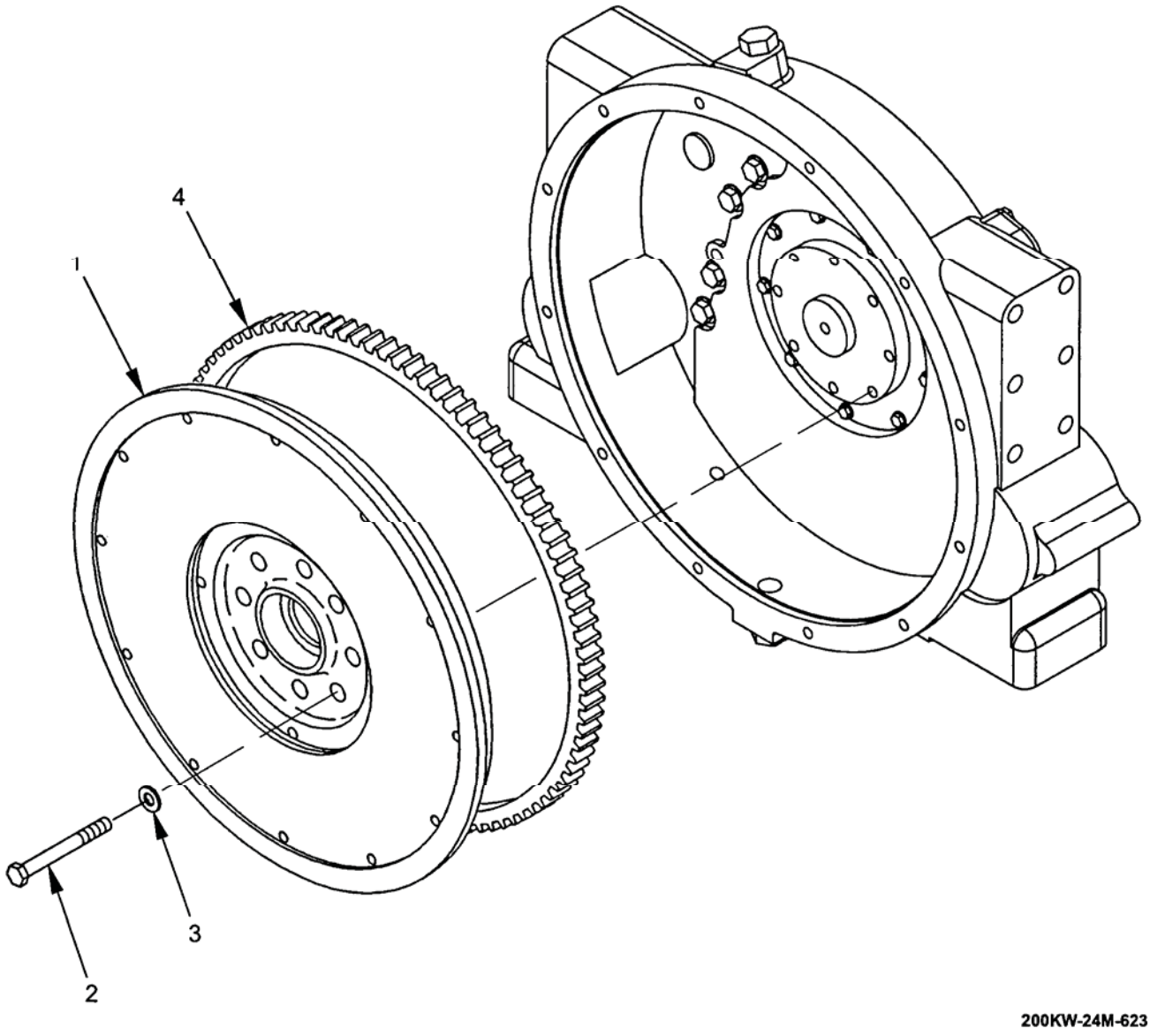

Figure 1. Flywheel.

END OF TASK

END OF WORK PACKAGE

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

CRANKSHAFT REAR SEAL MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Shop Equipment, Field Maintenance, Basic (WP 0123, Item 3)

Materials/Parts

Cap and plug set (WP 0124, Item 6)
Thread locking compound (WP 0124, Item 42)

Personnel Required

One

References

TM 9-6115-730-24P

Equipment Condition

Flywheel removed (WP 0111)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the engine.

REMOVAL

1. Remove three locking bolts (Figure 1, Item 1), washers (Figure 1, Item 2), six bolts (Figure 1, Item 3), and washers (Figure 1, Item 4).
2. Use a screwdriver to remove crankshaft rear seal (Figure 1, Item 5).
3. Remove O-ring (Figure 1, Item 6).

REMOVAL - Continued

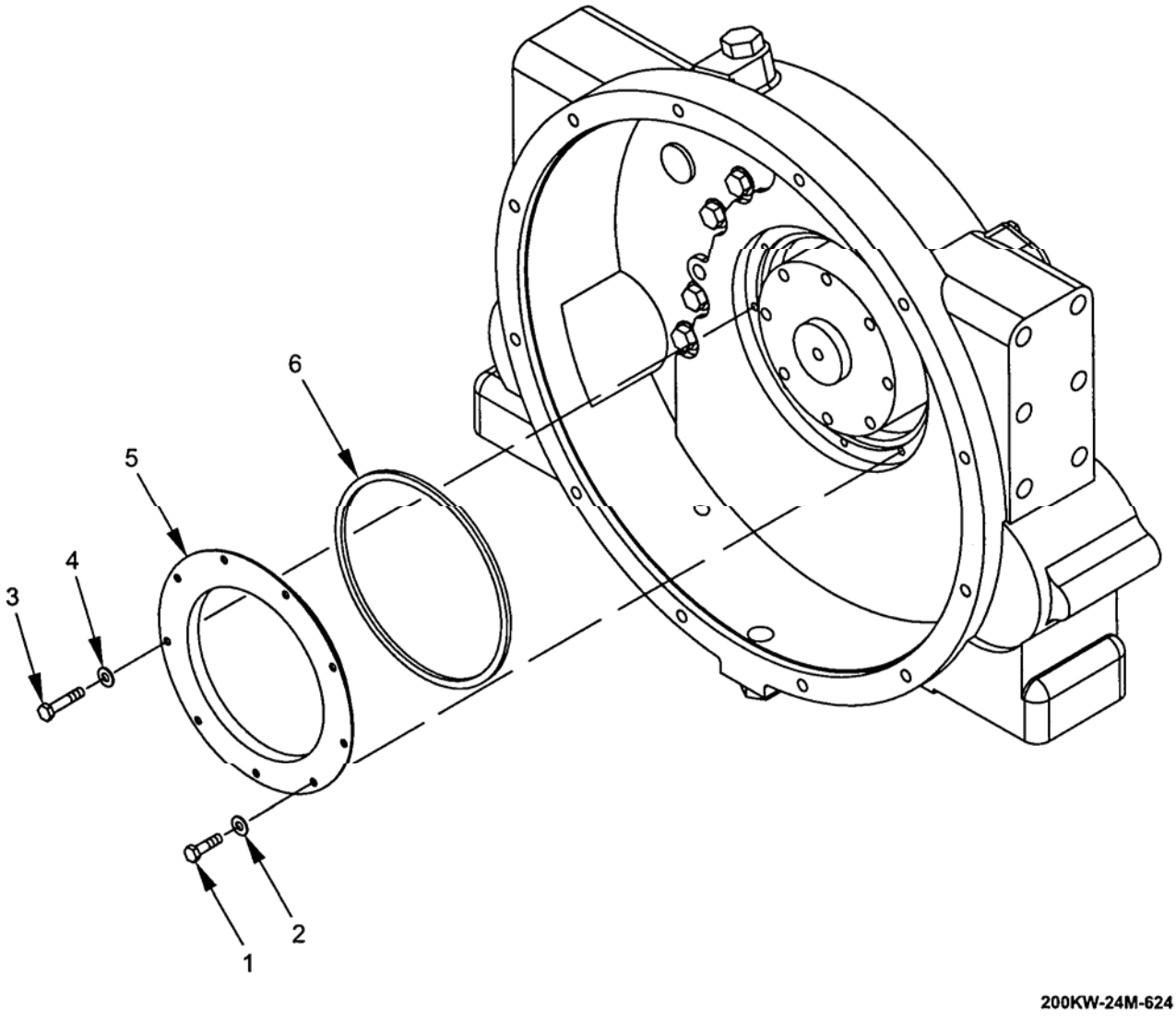

Figure 1. Crankshaft Rear Seal.

END OF TASK

INSTALLATION

1. Clean surface of crankshaft. Lubricate O-ring (Figure 1, Item 6) with engine oil and position on back of crankshaft rear seal.

NOTE

Leave shipping sleeve on crankshaft rear seal in place. Seal must be installed dry.

2. Position crankshaft rear seal (Figure 1, Item 5) on crankshaft and push into place. This will dislodge the shipping sleeve.

3. Install six washers (Figure 1, Item 4) and bolts (Figure 1, Item 3).

4. Apply thread locking compound to threads of three locking bolts (Figure 1, Item 1). Install three washers (Figure 1, Item 2) and locking bolts (Figure 1, Item 1) at bottom of crankshaft rear seal (Figure 1, Item 5). Torque locking bolts (Figure 1, Item 1) to 79-133 lb-in. (9-15 Nm).

5. Install flywheel (WP 0111).

END OF TASK

END OF WORK PACKAGE

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

FLYWHEEL HOUSING MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Shop Equipment, Field Maintenance, Basic (WP 0123, Item 3)

Materials/Parts

Cap and plug set (WP 0124, Item 6)
Sealant compound (WP 0124, Item 37)

Personnel Required

Two

References

TM 9-6115-730-24P

Equipment Condition

Starter removed (WP 0076)
Magnetic speed pickup removed (WP 0098)
Flywheel removed (WP 0111)
Crankshaft rear seal removed (WP 0112)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

WARNING

Flywheel housing weighs more than 50 pounds (23 kg) and requires a two-person lift. Lifting flywheel housing can cause back strain. Ensure proper lifting techniques are used when lifting flywheel housing. Failure to comply can cause injury to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the engine.

REMOVAL

1. Attach suitable lifting device to flywheel housing (Figure 1, Item 1).
2. Remove 12 bolts (Figure 1, Item 2), washers (Figure 1, Item 3), flywheel housing (Figure 1, Item 1), and seal (Figure 1, Item 4).
3. Remove two bolts (Figure 1, Item 5), washers (Figure 1, Item 6), cover (Figure 1, Item 7), and seal (Figure 1, Item 8).
4. Remove two plugs (Figure 1, Item 9) and seals (Figure 1, Item 10).
5. Remove plug (Figure 1, Item 11), seal (Figure 1, Item 12), plug (Figure 1, Item 13) and seal (Figure 1, Item 14).

END OF TASK

INSTALLATION

1. Install seal (Figure 1, Item 14), plug (Figure 1, Item 13), seal (Figure 1, Item 12), and plug (Figure 1, Item 11).
2. Install two seals (Figure 1, Item 10) and plugs (Figure 1, Item 9).
3. Install seal (Figure 1, Item 8), cover (Figure 1, Item 7), two washers (Figure 1, Item 6), and bolts (Figure 1, Item 5).
4. Install seal (Figure 1, Item 4), flywheel housing (Figure 1, Item 1), 12 washers (Figure 1, Item 3) and bolts (Figure 1, Item 2).
5. Install crankshaft rear seal (WP 0112).
6. Install flywheel (WP 0111).
7. Install magnetic speed pickup (WP 0098).
8. Install starter (WP 0076).

INSTALLATION - Continued

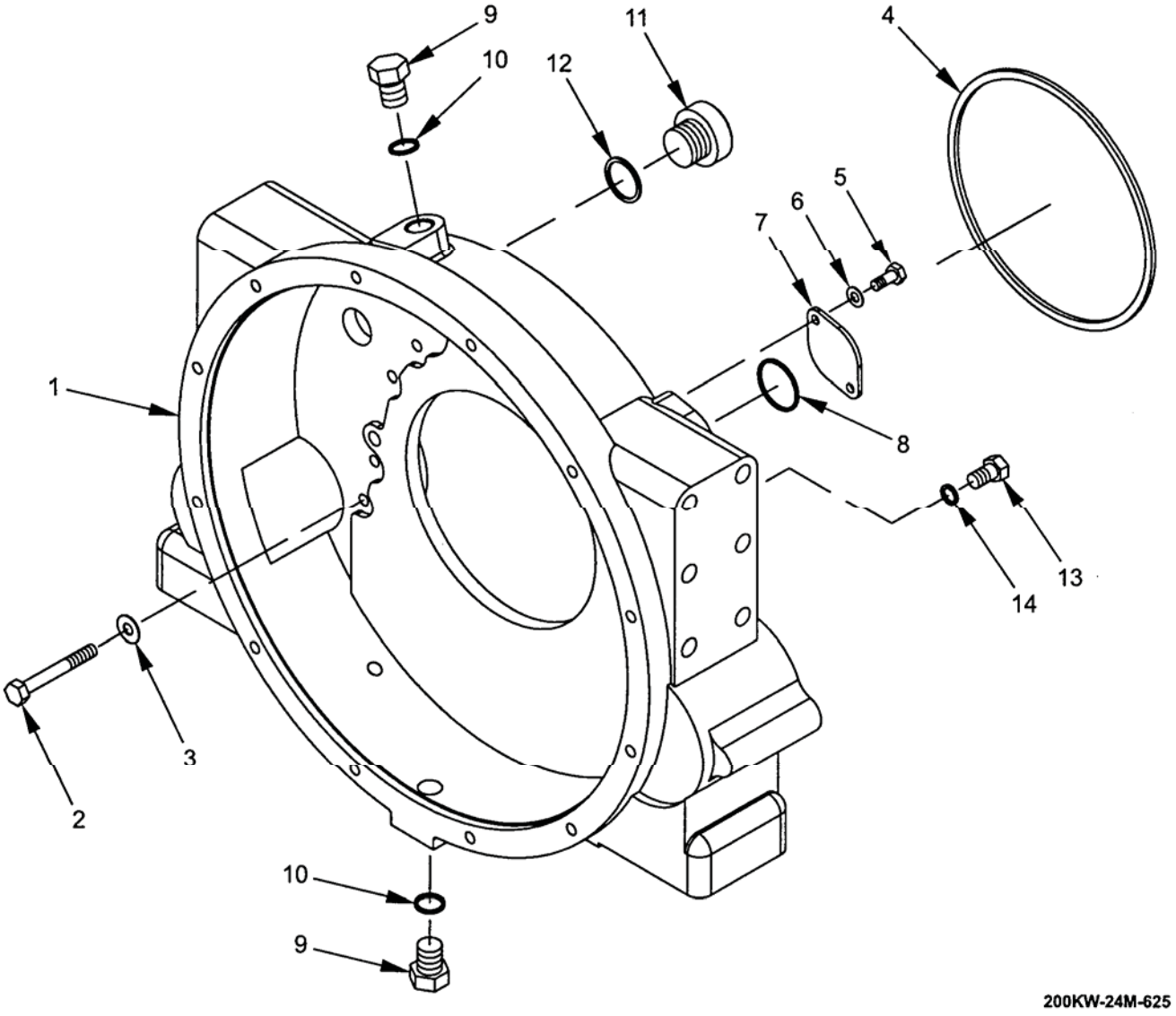

Figure 1. Flywheel Housing.

END OF TASK

END OF WORK PACKAGE

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

CRANKSHAFT REAR SEAL CARRIER MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Shop Equipment, Field Maintenance, Basic (WP 0123, Item 3)

Materials/Parts

Cap and plug set (WP 0124, Item 6)

Personnel Required

One

References

TM 9-6115-730-24P

Equipment Condition

Flywheel removed (WP 0111)
Flywheel housing removed (WP 0113)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the engine.

REMOVAL

1. Remove four bolts (Figure 1, Item 1), washers (Figure 1, Item 2), and crankshaft rear seal carrier (Figure 1, Item 3).

2. Remove gasket (Figure 1, Item 4) from cylinder block.

END OF TASK

INSTALLATION

1. Install gasket over two dowel pins (Figure 1, Item 5).

2. Install crankshaft rear seal carrier (Figure 1, Item 3), four washers (Figure 1, Item 2), and bolts (Figure 1, Item 1).

3. Install flywheel housing (WP 0113).

4. Install flywheel (WP 0111).

INSTALLATION - Continued

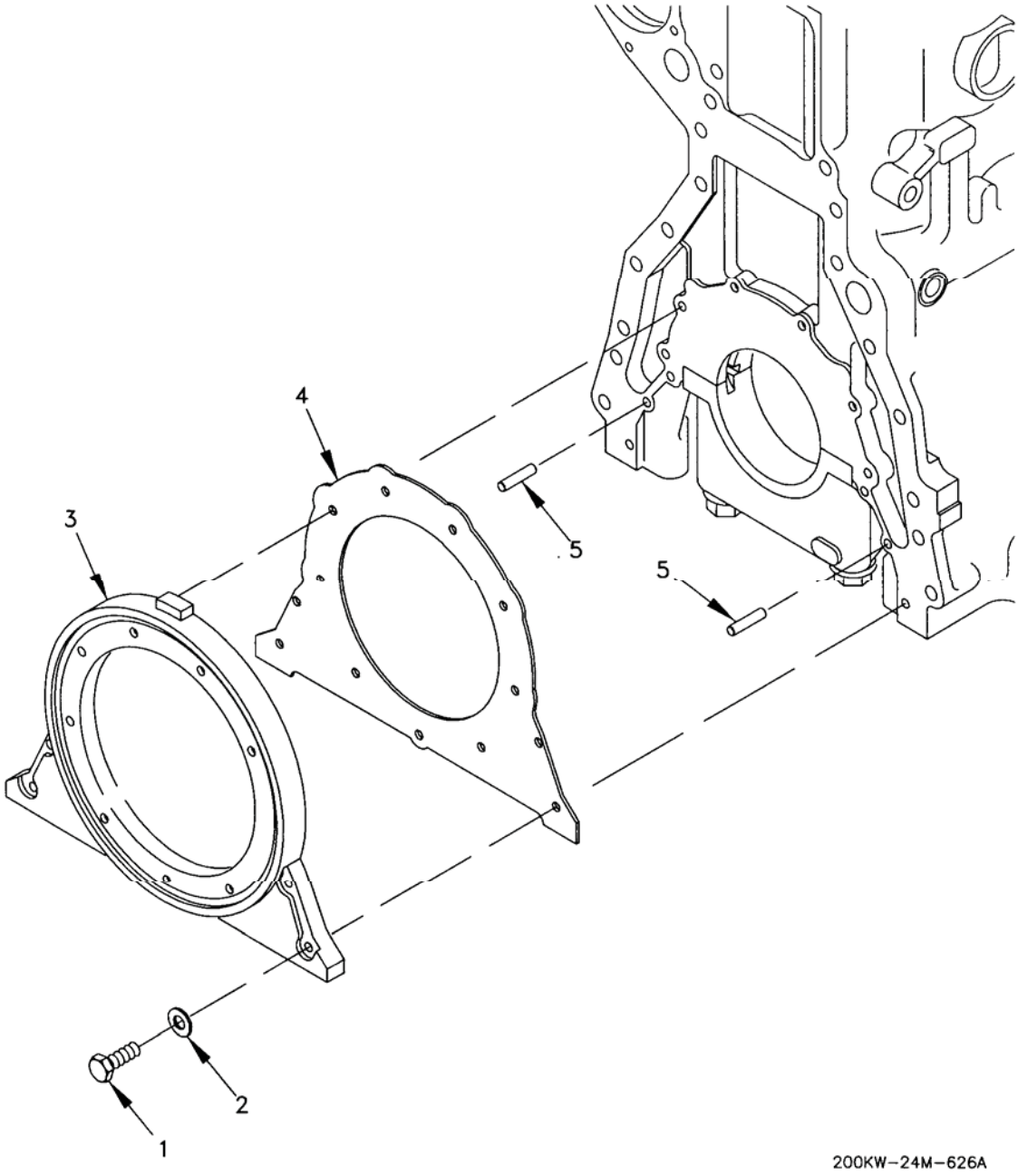

Figure 1. Crankshaft Rear Seal Carrier.

END OF TASK

END OF WORK PACKAGE

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

EXHAUST MANIFOLD MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Shop Equipment, Field Maintenance, Basic (WP 0123, Item 3)

Materials/Parts

Antiseize compound (WP 0124, Item 1)
Cap and plug set (WP 0124, Item 6)

Personnel Required

One

References

TM 9-6115-730-24P

Equipment Condition

Turbocharger removed (WP 0103)

WARNINGS

Metal jewelry will conduct electricity. All jewelry can become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply can cause injury or death to personnel by electrocution.

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the engine.

REMOVAL

1. Remove 12 locknuts (Figure 1, Item 1), washers (Figure 1, Item 2), spacers (Figure 1, Item 3), three exhaust manifolds (Figure 1, Item 4), (Figure 1, Item 5), and (Figure 1, Item 6), and six gaskets (Figure 1, Item 7).
2. Separate three exhaust manifolds (Figure 1, Item 4), (Figure 1, Item 5), and (Figure 1, Item 6).
3. Remove 12 studs (Figure 1, Item 8) from cylinder block.
4. If necessary, remove four studs (Figure 1, Item 9) from exhaust manifold (Figure 1, Item 5).

END OF TASK

INSTALLATION

1. If removed, apply antiseize compound to threads of four studs (Figure 1, Item 9) and install in exhaust manifold (Figure 1, Item 5). Torque studs (Figure 1, Item 9) to 22-30 lb-ft (30-40 Nm).
2. Apply antiseize compound to threads of 12 studs (Figure 1, Item 8) and install in cylinder block. Torque studs (Figure 1, Item 8) to 22-30 lb-ft (30-40 Nm).
3. Assemble three exhaust manifolds (Figure 1, Item 6), (Figure 1, Item 5), and (Figure 1, Item 4).
4. Install six gaskets (Figure 1, Item 7), three exhaust manifolds (Figure 1, Item 6), (Figure 1, Item 5), and (Figure 1, Item 4), 12 spacers (Figure 1, Item 3), and washers (Figure 1, Item 2).
5. Apply antiseize compound to threads of 12 locknuts (Figure 1, Item 1) and install on 12 studs (Figure 1, Item 8). Torque 12 locknuts (Figure 1, Item 1) to 34-48 lb-ft (45-65 Nm).
6. Install turbocharger (WP 0103).

INSTALLATION - Continued

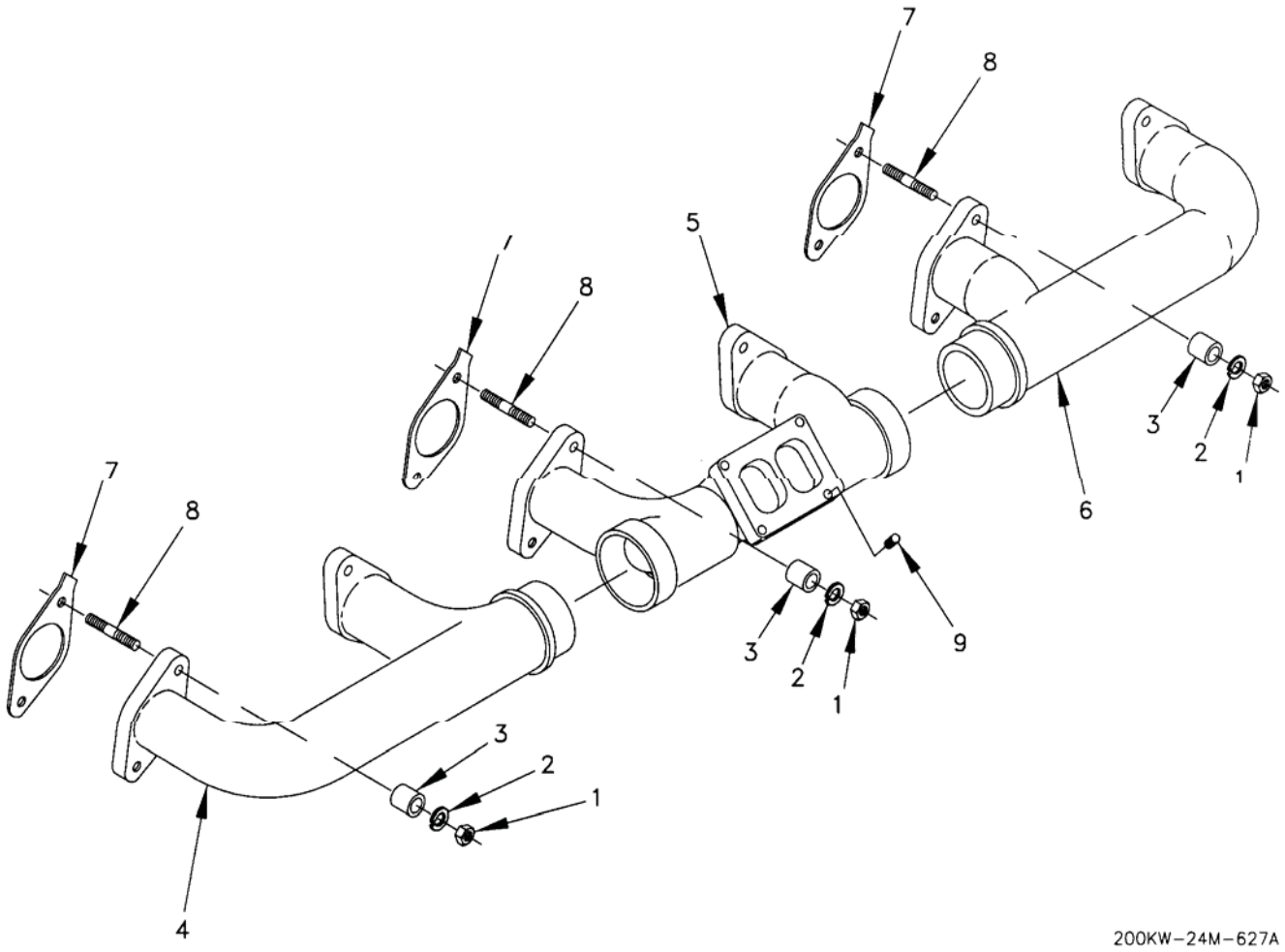

Figure 1. Exhaust Manifold.

END OF TASK

END OF WORK PACKAGE

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
INLET MANIFOLD MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Shop Equipment, Field Maintenance, Basic (WP 0123, Item 3)

Materials/Parts

Seal

Personnel Required

One

References

TM 9-6115-730-24P

Equipment Condition

Turbo outlet pressure sensor and intake manifold air temperature sensor removed (WP 0098)

WARNINGS

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DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the engine.

REMOVAL

1. Remove six bolts (Figure 1, Item 1), washers (Figure 1, Item 2), bolts (Figure 1, Item 3), washers (Figure 1, Item 4), inlet manifold (Figure 1, Item 5) and three gaskets (Figure 1, Item 6).

2. If necessary, remove plug (Figure 1, Item 7), plug (Figure 1, Item 8), seal (Figure 1, Item 9), and plug (Figure 1, Item 10).

3. If necessary, remove four screws (Figure 1, Item 11), washers (Figure 1, Item 12), elbow (Figure 1, Item 13), and gasket (Figure 1, Item 14).

4. If necessary, remove plug (Figure 1, Item 15).

END OF TASK

INSTALLATION

1. If necessary, install plug (Figure 1, Item 15).

2. If necessary, install elbow (Figure 1, Item 13) and gasket (Figure 1, Item 14) with four screws (Figure 1, Item 11) and washers (Figure 1, Item 12).

3. If necessary, install plug (Figure 1, Item 10), seal (Figure 1, Item 9), plug (Figure 1, Item 8), and plug (Figure 1, Item 7).

4. Install three gaskets (Figure 1, Item 6), inlet manifold (Figure 1, Item 5), six washers (Figure 1, Item 4), bolts (Figure 1, Item 3), washers (Figure 1, Item 2), and bolts (Figure 1, Item 1). Torque bolts (Figure 1, Item 3) and (Figure 1, Item 1) to 34-48 lb-ft (45-65 Nm).

5. Install intake manifold air temperature sensor and turbo outlet pressure sensor (WP 0098).

INSTALLATION - Continued

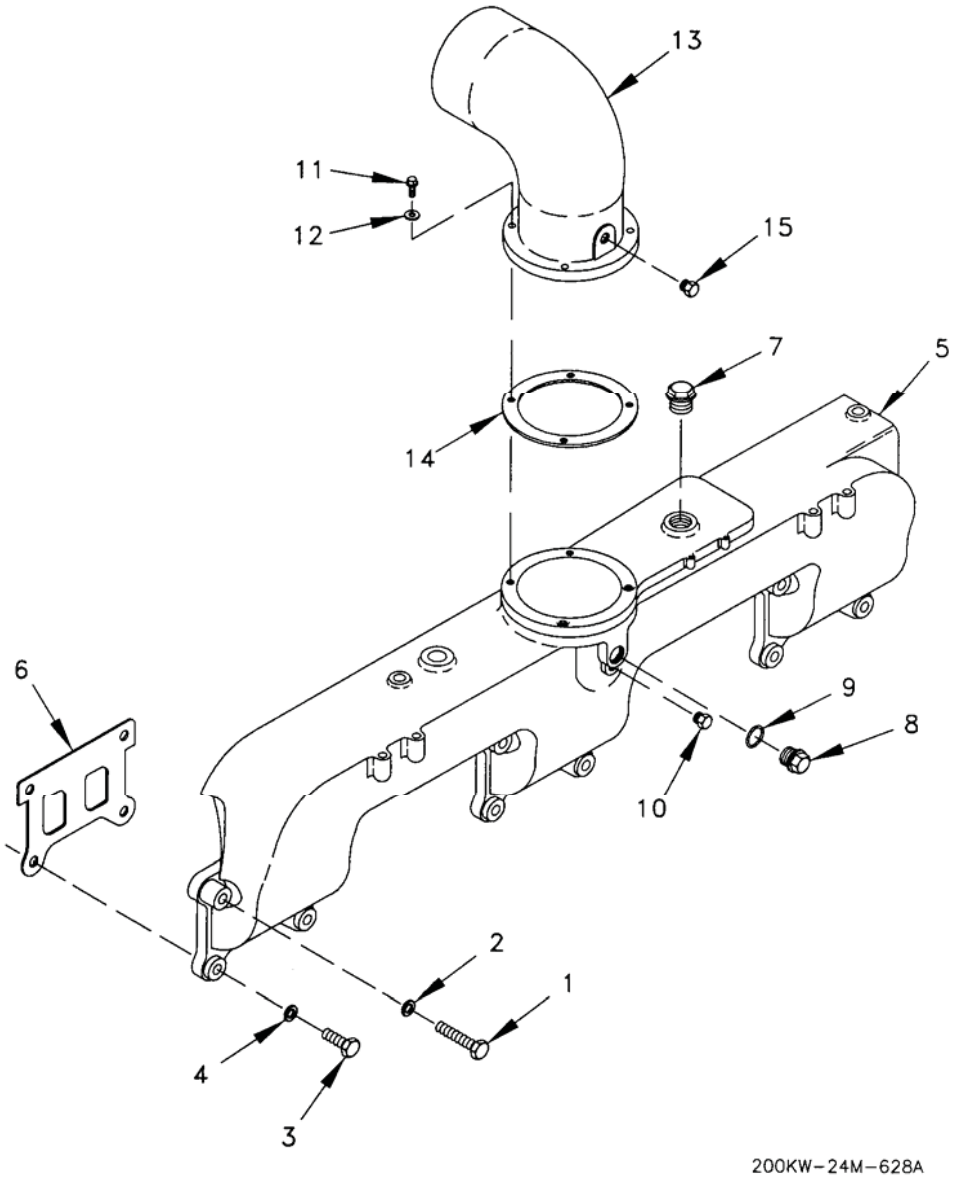

Figure 1. Inlet Manifold.

END OF TASK

END OF WORK PACKAGE

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
OIL PAN MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Shop Equipment, Field Maintenance, Basic (WP 0123, Item 3)

Materials/Parts

Cap and plug set (WP 0124, Item 6)
Engine oil (WP 0124, Items 23-30)
Gasket
Seal

Personnel Required

One

References

TM 9-6115-730-24P

Equipment Condition

Engine oil drained (WP 0079)

WARNINGS

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High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the engine.

REMOVAL

1. Remove 14 bolts (Figure 1, Item 1), washers (Figure 1, Item 2), isolators (Figure 1, Item 3), and sleeves (Figure 1, Item 4), and remove oil pan (Figure 1, Item 5) and gasket (Figure 1, Item 6).

2. Remove drain valve (Figure 1, Item 7), pipe reducer (Figure 1, Item 8), bushing (Figure 1, Item 9), recessed washer (Figure 1, Item 10), and seal (Figure 1, Item 11), plug (Figure 1, Item 12), magnetic plug (Figure 1, Item 13), and seal (Figure 1, Item 14).

3. If necessary, scrape gasket material (Figure 1, Item 6) off engine block and oil pan.

4. Inspect magnetic plug (Figure 1, Item 13) for metal particles and wipe clean. Notify supervisor if metal particles are found on magnetic plug.

END OF TASK

INSTALLATION

1. Install seal (Figure 1, Item 14), magnetic plug (Figure 1, Item 13), plug (Figure 1, Item 12), seal (Figure 1, Item 11), recessed washer (Figure 1, Item 10), bushing (Figure 1, Item 9), pipe reducer (Figure 1, Item 8), and drain valve (Figure 1, Item 7).

2. Install gasket (Figure 1, Item 6), oil pan (Figure 1, Item 5), 14 sleeves (Figure 1, Item 4), isolators (Figure 1, Item 3), washers (Figure 1, Item 2), and bolts (Figure 1, Item 1).

3. Refill lubrication system (WP 0079).

INSTALLATION - Continued

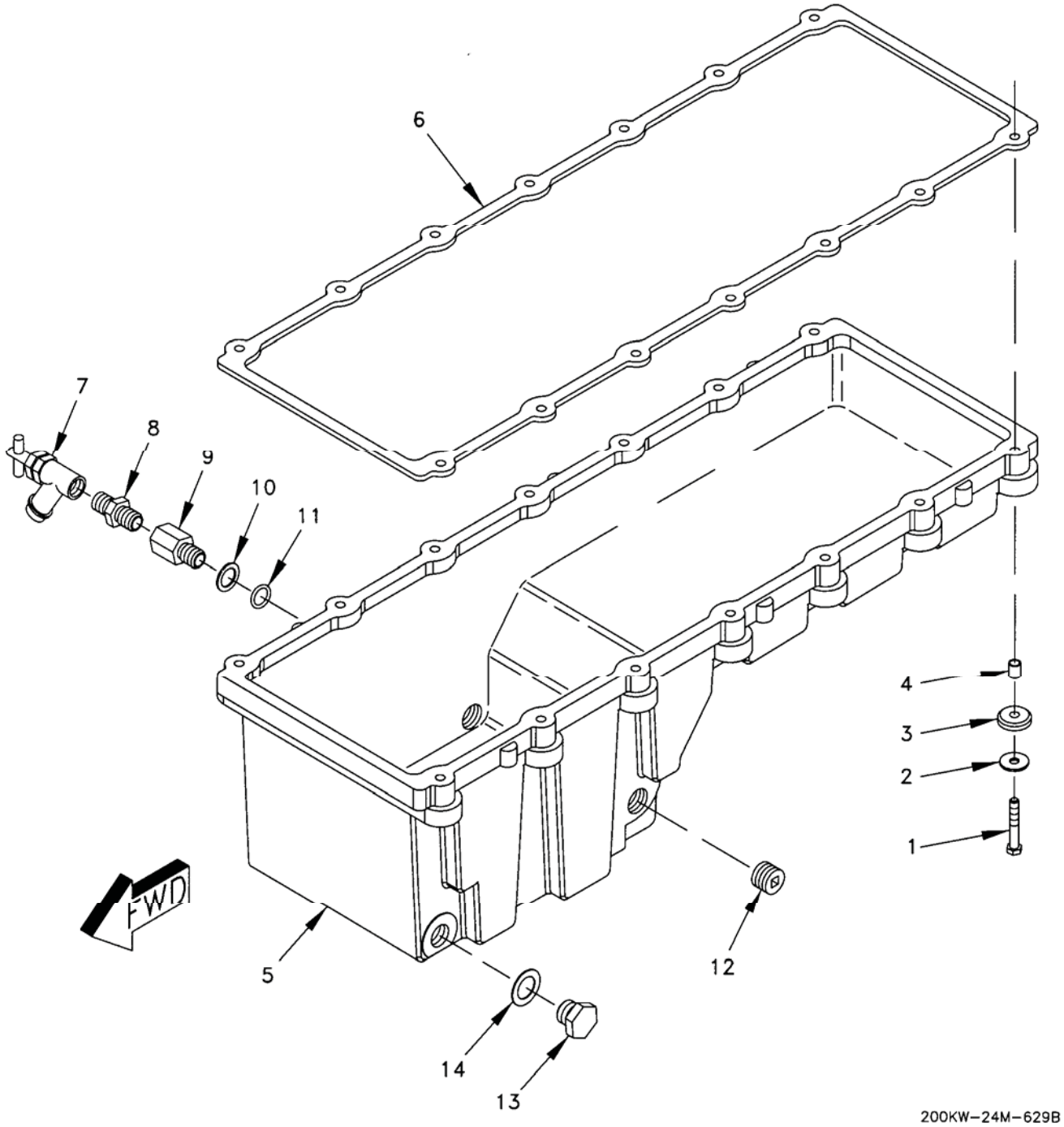

Figure 1. Oil Pan.

END OF TASK

END OF WORK PACKAGE

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

UNIT INJECTOR MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Shop Equipment, Field Maintenance, Basic (WP 0123, Item 3)

Materials/Parts

Cap and plug set (WP 0124, Item 6)
Engine oil (WP 0124, Items 23-30)

Personnel Required

One

References

TM 9-6115-730-24P

Equipment Condition

Valve cover and base removed (WP 0100)
Rocker shaft and pushrods removed (WP 0119)
Manifold in tube removed (WP 0067)

WARNINGS

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High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the engine.

REMOVAL

NOTE

Mark valve bridges for correct assembly.

1. Disconnect unit injector harness connector from unit injector (Figure 1, Item 1).
2. Remove bolt (Figure 1, Item 2), spacer (Figure 1, Item 3), and clamp (Figure 1, Item 4).
3. Carefully pry clamp and unit injector (Figure 1, Item 1) out of cylinder head.
4. Repeat steps 3 thru 5 for remaining unit injectors.

END OF TASK

CLEANING

1. Clean injector seating (A) with tapered brush.
2. Clean injector bore (B) with small bore brush.

END OF TASK

INSTALLATION

NOTE

If fuel injector is replaced, the new injector electronic injector code must be programmed into the engine personality module software using the calibration menu. If the new code is not entered, the previous unit injector's characteristics will be assumed.

If it is not possible to immediately reprogram the new injector code, the engine will not be severely harmed, but the new code should be entered as soon as possible to optimize engine performance.

1. If new injector is being installed, record the new injector code (Figure 1, C), located on the solenoid.
2. Lightly lubricate three seals (Figure 1, D) and the bore (Figure 1, B) with engine oil.
3. Position unit injector (Figure 1, Item 1) on cylinder head. Push down on injector spring to seat unit injector (Figure 1, Item 1).
4. Install clamp (Figure 1, Item 4), spacer (Figure 1, Item 3) and bolt (Figure 1, Item 2) and tighten bolt. This will completely seat the unit injector (Figure 1, Item 1). Torque bolt (Figure 1, Item 2) to 17-27 lb-ft (23-37 Nm).
5. Connect unit injector harness connector.
6. Repeat steps 1 thru 5 for remaining unit injectors.
7. Install rocker shaft and pushrods (WP 0119).

INSTALLATION - Continued

8. Install valve cover and base (WP 0100).

9. Load new injector code/codes (Figure 1, C) into ECM (WP 0013, SYMPTOM 12).

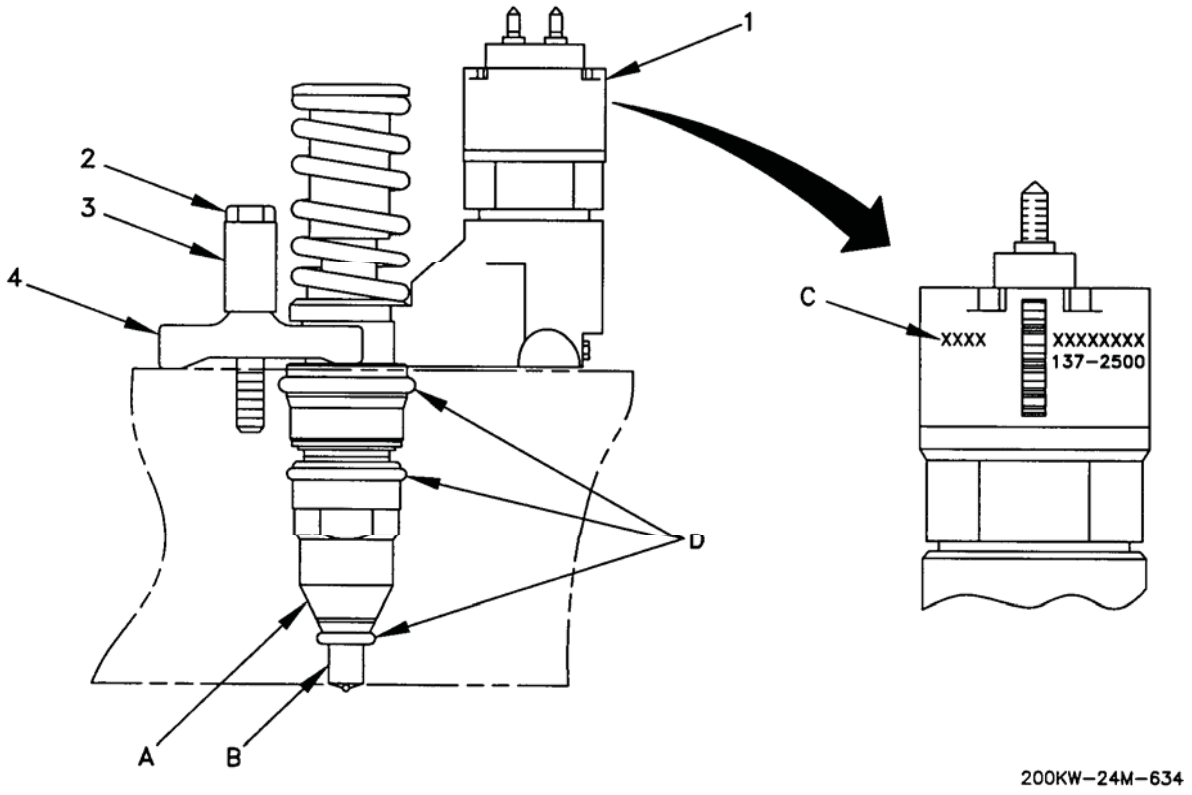

Figure 1. Unit Injector.

END OF TASK

END OF WORK PACKAGE

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

ROCKER SHAFT AND PUSHROD MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Shop Equipment, Field Maintenance, Basic (WP 0123, Item 3)

Materials/Parts

Cap and plug set (WP 0124, Item 6)
Engine oil (WP 0124, Items 23-30)
O-Ring
Seal

Personnel Required

Two

References

TM 9-6115-730-24P

Equipment Condition

Valve cover and base removed (WP 0100)

WARNINGS

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High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the heater system.

REMOVAL

NOTE

Place identification mark on each rocker arm to assure installation in the proper location.

1. Remove two bolts (Figure 1, Item 1) and rocker arm assembly (Figure 1, Item 2).
2. Remove injector pushrod (Figure 1, Item 3) and two valve pushrods (Figure 1, Item 4). Keep each pushrod (Figure 1, Item 3) and (Figure 1, Item 4) with its rocker arm assembly (Figure 1, Item 2).
3. Remove two valve bridges (Figure 1, Item 5).
4. Repeat steps 2 thru 4 for remaining five rocker arm assemblies.

END OF TASK

DISASSEMBLY

1. Remove nut (Figure 1, Item 6) and adjustment screw (Figure 1, Item 7) from exhaust valve rocker arm (Figure 1, Item 8).
2. Remove nut (Figure 1, Item 9), adjustment screw (Figure 1, Item 10), button (Figure 1, Item 11), and O-ring (Figure 1, Item 12) from unit injector rocker arm (Figure 1, Item 13).
3. Remove nut (Figure 1, Item 14) and adjustment screw (Figure 1, Item 15) from inlet valve rocker arm (Figure 1, Item 16).
4. Remove shaft (Figure 1, Item 17), from support (Figure 1, Item 18), and remove spring pin (Figure 1, Item 19), exhaust valve rocker arm (Figure 1, Item 8), unit injector rocker arm (Figure 1, Item 13), and inlet valve rocker arm (Figure 1, Item 16).
5. If necessary, remove plug (Figure 1, Item 20) from shaft (Figure 1, Item 17), and remove dowel (Figure 1, Item 21) from support (Figure 1, Item 18).
6. If necessary, remove bearing (Figure 1, Item 22) from unit injector rocker arm (Figure 1, Item 13).
7. Repeat steps 1 thru 6 for remaining five rocker arm assemblies.

DISASSEMBLY - Continued

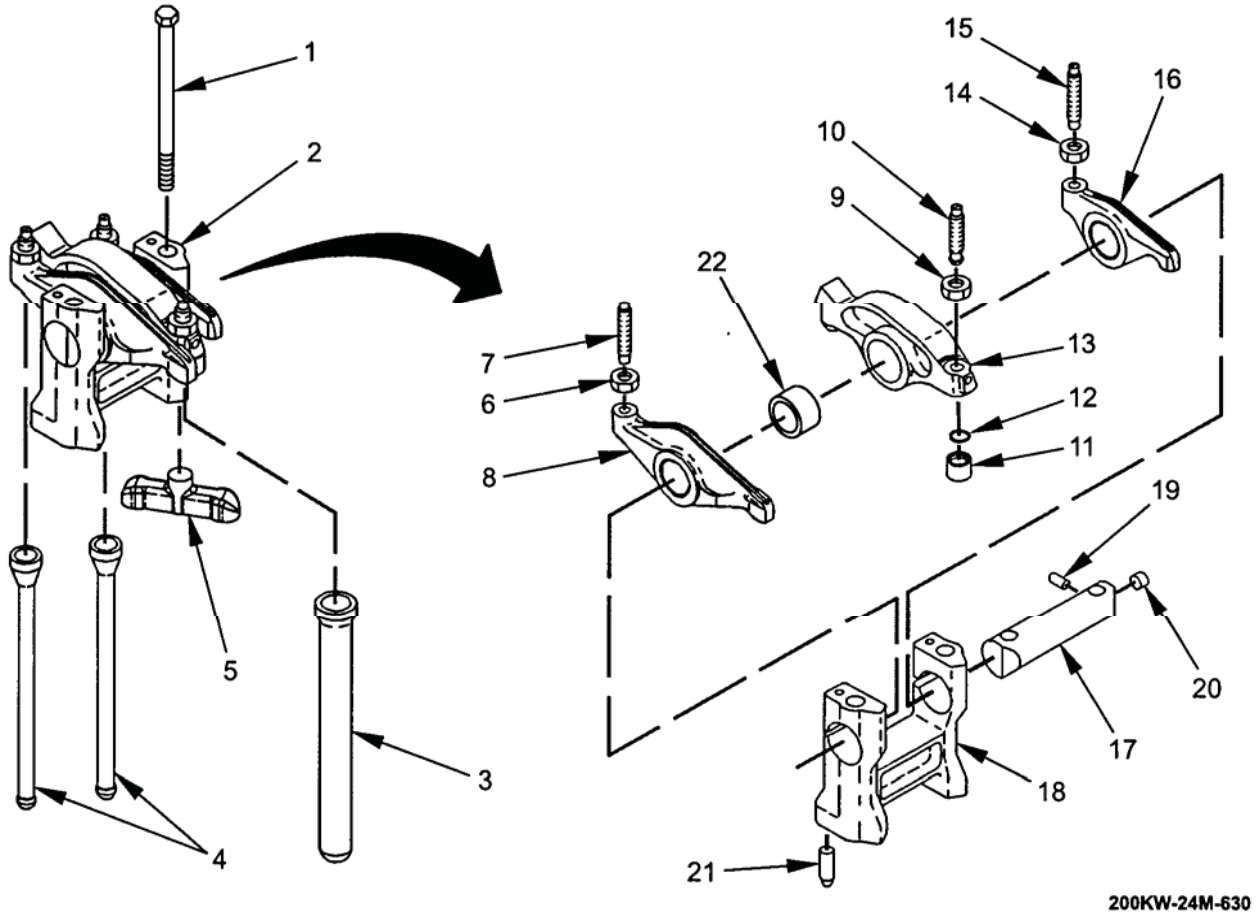

Figure 1. Rocker Shaft and Pushrod Removal and Installation.

END OF TASK

INSPECTION OF INSTALLED ITEMS

1. Inspect rocker arm shaft (Figure 2, Item 17) for minimum diameter (Dimension A) of 1.3382 in. (33.99 mm).
2. Inspect all parts for signs of excessive wear or cracking.
3. Inspect bore in unit injector rocker arm bearing (Figure 2, Item 22) for inside diameter (Dimension B) of 1.340-1.341 in. (34.035-34.065 mm).
4. Inspect bore in unit injector rocker arm (Figure 2, Item 13) for inside diameter (Dimension C) of 1.456-1.457 in. (36.98-37.02 mm).

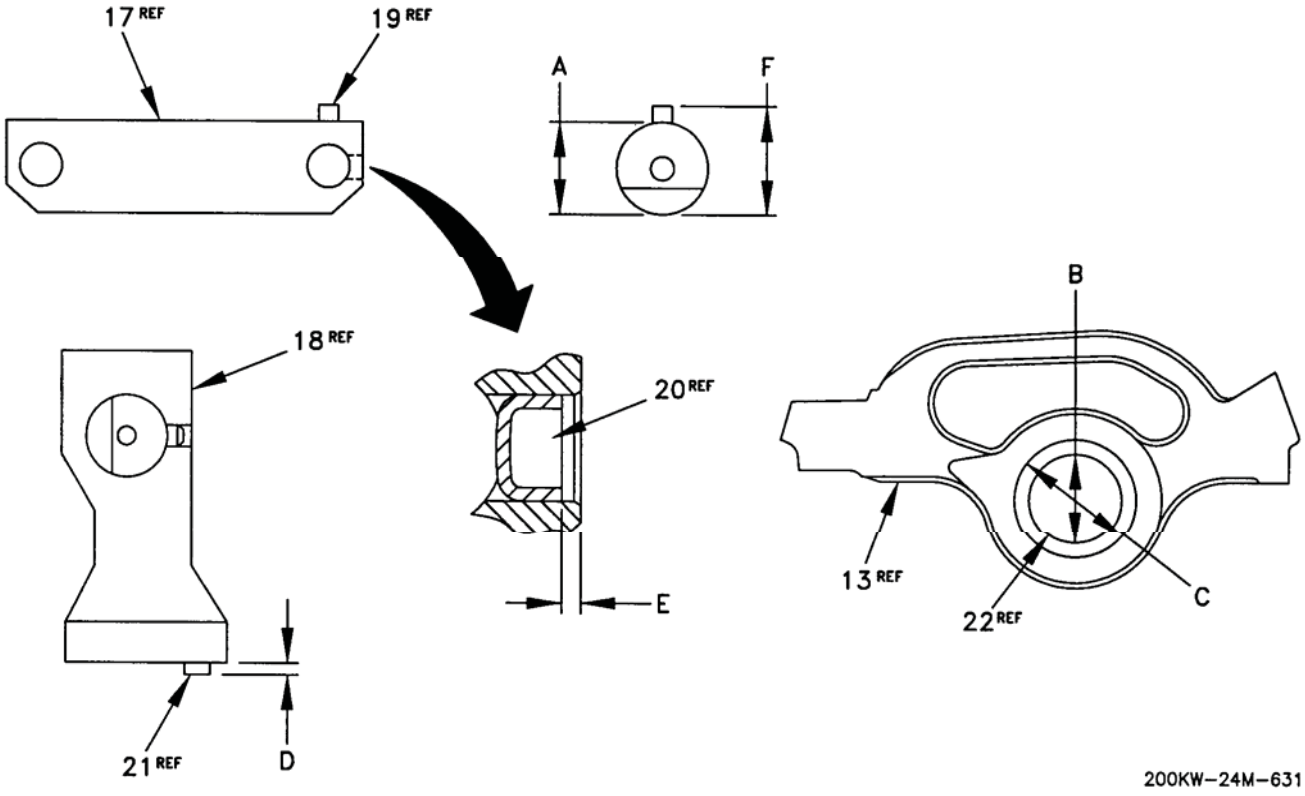

Figure 2. Rocker Shaft Inspection.

END OF TASK

ASSEMBLY

1. If removed, install bearing (Figure 1, Item 22) in unit injector rocker arm (Figure 1, Item 13) so that oil hole openings in bearing are centered over oil passages in rocker arm, and so that bearing does not extend beyond either face of rocker arm.

2. If removed, install dowel (Figure 1, Item 21) in support (Figure 1, Item 18) so that it extends 0.178-0.216 in. (4.5-5.5 mm) (Figure 2, Dimension D) from bottom of support.

3. If removed install plug (Figure 1, Item 20) in shaft (Figure 1, Item 17) to a depth of 0.39-0.59 in. (1.0-1.5 mm) (Figure 2, Dimension E).

4. Install inlet valve rocker arm (Figure 1, Item 16), unit injector rocker arm (Figure 1, Item 13), exhaust valve rocker arm (Figure 1, Item 8), spring pin (Figure 1, Item 19), and shaft (Figure 1, Item 17) in support (Figure 1, Item 18). Install spring pin (Figure 1, Item 19) so that it extends 1.54-1.61 in. (39-41 mm) (Figure 2, Dimension F) from the opposite side of the shaft (Figure 1, Item 17).

5. Install adjustment screw (Figure 1, Item 15) and nut (Figure 1, Item 14) on inlet valve rocker arm (Figure 1, Item 16).

6. Install O-ring (Figure 1, Item 12), button (Figure 1, Item 11), adjustment screw (Figure 1, Item 10), and nut (Figure 1, Item 9) on unit injector rocker arm (Figure 1, Item 13).

7. Install adjustment screw (Figure 1, Item 7) and nut (Figure 1, Item 6) on exhaust valve rocker arm (Figure 1, Item 8).

8. Repeat steps 1 thru 7 for five remaining rocker arm assemblies.

END OF TASK

INSTALLATION

1. Lubricate top pad of two valve bridges (Figure 1, Item 5) with engine oil and install.

2. Install two valve pushrods (Figure 1, Item 4), injector pushrod (Figure 1, Item 3), rocker arm assembly (Figure 1, Item 2), and two bolts (Figure 1, Item 1).

3. Repeat steps 1 and 2 for remaining five rocker arm assemblies.

4. Perform valve lash check.

END OF TASK

VALVE LASH CHECK

WARNING

Do not use the engine starter to turn the flywheel. Failure to comply can cause injury to personnel.

CAUTION

All clearance measurements must be made with the engine stopped and the valves fully closed. Otherwise, incorrect adjustments will be made resulting in engine damage.

NOTE

Valve lash adjustment is not necessary if measurement is in the acceptable range.

Engine must be turned with the eight large bolts on flywheel.

1. Remove crankshaft vibration damper and pulley (WP 0104).
2. Remove two bolts (Figure 3, Item 23), washers (Figure 3, Item 24), cover (Figure 3, Item 25), and seal (Figure 3, Item 26) from flywheel housing.
3. Install one bolt (Figure 3, Item 23) in hole 5-6 inches (12.7-15.2 cm) above where cover (Figure 3, Item 25) was removed. This becomes the timing bolt (Figure 3, Item 23).
4. Using eight large bolts on flywheel, turn flywheel in direction of normal engine rotation, which is counterclockwise (CCW) when viewed from flywheel end, until timing bolt (Figure 3, Item 23) engages with threaded hole in flywheel.

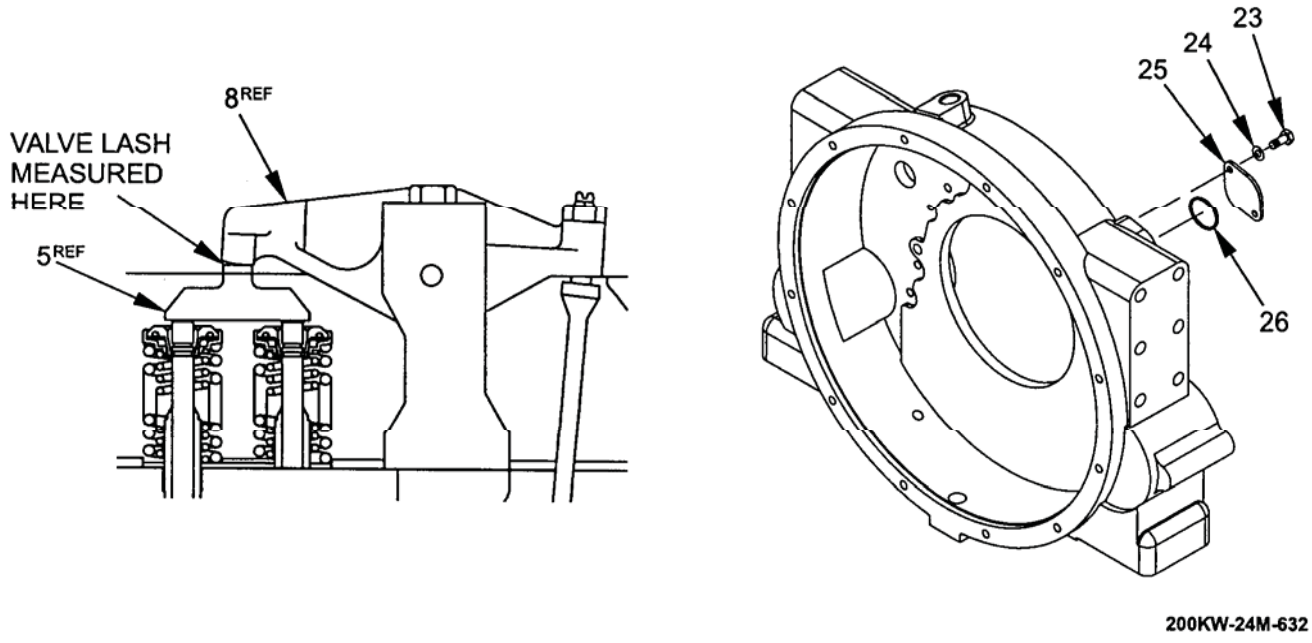

Figure 3. Valve Lash Check.

VALVE LASH CHECK - Continued

NOTE

If flywheel is turned beyond point that timing bolt (Figure 3, Item 23) engages in the threaded hole, the flywheel must be turned opposite normal engine rotation approximately 30 degrees. Then turn the flywheel in the direction of normal rotation (CCW) until timing bolt (Figure 3, Item 23) engages with threaded hole. This removes play from gears.

Inlet valves and exhaust valves for the No. 1 cylinder are fully closed if No. 1 piston is on the compression stroke and the rocker arms can be moved by hand. If the rocker arms cannot be moved by hand and the valves are slightly open, the No. 1 piston is on the exhaust stroke.

When the actual stroke position is identified and the other stroke is needed, it is necessary to remove the timing bolt (Figure 3, Item 23) from the flywheel, turn the flywheel counterclockwise (CCW) 360 degrees, and reinstall the timing bolt (Figure 3, Item 23).

Valve lash is measured between the rocker arm and the valve bridge.

5. Refer to Table 1 for crankshaft positions for valve lash settings. Check inlet valves 1, 2, and 4, and exhaust valves 1, 3, and 5, against criteria in Table 2.

Table 1. Crankshaft Positions for Valve Lash Setting.

Rotation (viewed from flywheel end)	Counterclockwise
Check and adjust with piston no. 1 on this stroke	Top center compression stroke
Inlet Valves	1-2-4
Exhaust Valves	1-3-5
Unit Injectors	3, 5, 6
Check and adjust with no. 6 piston on this stroke	Top center compression stroke
Inlet Valves	3-5-6
Exhaust Valves	2-4-6
Unit Injectors	1, 2, 4
Firing order	1-5-3-6-2-4

Table 2. Check for Valve Lash.

VALVES	ACCEPTABLE RANGE
Inlet	0.012-0.018 in. (0.30-0.46 mm)
Exhaust	0.022-0.028 in. (0.56-0.72 mm)

VALVE LASH CHECK - Continued

6. Remove timing bolt (Figure 3, Item 23) and turn flywheel 360 degrees in the direction of engine rotation. This will put No. 6 piston at top center on the compression stroke. Install timing bolt (Figure 3, Item 23) in hole.

7. Check inlet valves 3, 5, and 6, and exhaust valves 2, 4, and 6, against criteria in Table 2.

8. If valve lash for all valves is within acceptable range Table 2, proceed with steps 10 thru 12.

9. Perform valve lash adjustment on any valve with readings outside the acceptable range.

10. Remove timing bolt (Figure 3, Item 23) from flywheel. Install seal (Figure 3, Item 26), cover (Figure 3, Item 25), two washers (Figure 3, Item 24), and bolts (Figure 3, Item 23) on back of flywheel housing.

11. Install crankshaft vibration damper and pulley (WP 0104).

12. Install valve cover and base (WP 0100).

END OF TASK

VALVE LASH ADJUSTMENT

1. Loosen nut (Figure 1, Item 14) and loosen adjustment screw (Figure 1, Item 15) on inlet valve rocker arm (Figure 1, Item 16) for cylinders 1, 2, and 4. Loosen nut (Figure 1, Item 6) and loosen adjustment screw (Figure 1, Item 7) on exhaust valve rocker arm (Figure 1, Item 8) for cylinders 1, 3, and 5.

2. Refer to Table 3 and insert feeler gage of correct dimension between rocker arm (Figure 1, Item 16) or (Figure 1, Item 8) and valve bridge (Figure 1, Item 5).

Table 3. Valve Lash Settings.

VALVES	ACCEPTABLE RANGE
Inlet	0.015 in. (0.38 mm)
Exhaust	0.025 in. (0.64 mm)

3. Turn adjustment screw (Figure 1, Item 15) or (Figure 1, Item 7) clockwise (CW) until rocker arm (Figure 1, Item 16) or (Figure 1, Item 8) is set to specification in Table 3.

4. Tighten nut (Figure 1, Item 14) or (Figure 1, Item 6) to 17-27 lb-ft (23-37 Nm) and check adjustment again.

5. Loosen nut (Figure 1, Item 9) and loosen adjustment screw (Figure 1, Item 10) on unit injectors for cylinders 3, 5, and 6.

6. Turn adjustment screw (Figure 1, Item 10) clockwise (CW) until contact is made with unit injector. Turn adjustment screw (Figure 1, Item 10) CW an additional 180 degrees (1/2 turn). Tighten nut (Figure 1, Item 9) to 34-47 lb-ft (45-65 Nm).

VALVE LASH ADJUSTMENT - Continued

7. Remove timing bolt (Figure 1, Item 23) and turn flywheel 360 degrees in the direction of engine rotation. This will put No. 6 piston at top center on the compression stroke. Install timing bolt (Figure 1, Item 23) in hole.

8. Loosen nut (Figure 1, Item 14) and loosen adjustment screw (Figure 1, Item 15) on inlet valve rocker arm (Figure 1, Item 16) for cylinders 3, 5, and 6. Loosen nut (Figure 1, Item 6) and loosen adjustment screw (Figure 1, Item 7) on exhaust valve rocker arm (Figure 1, Item 8) for cylinders 2, 4, and 6.

9. Refer to Table 3 and insert feeler gage of correct dimension between rocker arm (Figure 1, Item 16) or (Figure 1, Item 8) and valve bridge (Figure 1, Item 5).

10. Turn adjustment screw (Figure 1, Item 15) or (Figure 1, Item 7) clockwise (CW) until rocker arm (Figure 1, Item 16) or (Figure 1, Item 8) is set to specification in Table 3.

11. Tighten nut (Figure 1, Item 14) or (Figure 1, Item 6) to 13-23 lb-ft (18-32 Nm) and check adjustment again.

12. Loosen nut (Figure 1, Item 9) and loosen adjustment screw (Figure 1, Item 10) on unit injectors for cylinders 1, 2, and 4.

13. Turn adjustment screw (Figure 1, Item 10) clockwise (CW) until contact is made with unit injector. Turn adjustment screw (Figure 1, Item 10) CW an additional 180 degrees (1/2 turn). Tighten nut (Figure 1, Item 9) to 34-47 lb-ft (45-65 Nm).

14. Remove timing bolt (Figure 3, Item 23) from flywheel. Install seal (Figure 3, Item 26), cover (Figure 3, Item 25), two washers (Figure 3, Item 24), and bolts (Figure 3, Item 23) on back of flywheel housing.

15. Install crankshaft vibration damper and pulley (WP 0104).

16. Install valve cover and base (WP 0100).

END OF TASK

END OF WORK PACKAGE

DIRECT SUPPORT (FIELD) LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

CYLINDER HEAD MAINTENANCE

INITIAL SETUP:

Tools and Special Tools

Shop Equipment, Automotive Maintenance, Common No. 1 (WP 0123, Item 2)
Shop Equipment, Field Maintenance, Basic (WP 0123, Item 3)

Materials/Parts

Antiseize compound (WP 0124, Item 1)
Cap and plug set (WP 0124, Item 6)
Cleaning solvent (WP 0124, Item 8)
Engine oil (WP 0124, Items 23-30)
Gasket

Personnel Required

Two

References

TM 9-6115-730-24P

Equipment Condition

Thermostat housing removed (WP 0081)
Valve cover and base removed (WP 0100)
Fuel filter base removed (WP 0101)
Exhaust manifold removed (WP 0115)
Inlet manifold removed (WP 0116)
Rocker shaft and pushrods removed (WP 0119)

WARNINGS

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DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply can cause injury or death to personnel.

High voltage is produced when this generator set is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

High voltage is produced when the generator set is in operation. Never attempt to start or maintain the generator set unless it is properly grounded. Failure to comply can cause injury or death to personnel.

CAUTION

All fittings and openings must be capped or plugged immediately after opening to prevent contamination of the engine.

REMOVAL

1. Remove 26 bolts (Figure 1, Item 1) and washers (Figure 1, Item 2).

2. Remove seven bolts (Figure 1, Item 3).

WARNING

Cylinder head weighs more than 300 pounds (135 kg) and requires an assistant and a suitable lifting device. Ensure proper lifting techniques are used when lifting cylinder head. Failure to comply can cause injury to personnel.

CAUTION

Cylinder head must be removed level and straight up, or damage will result.

3. With lifting device attached to front lifting bracket (Figure 1, Item 4) and rear lifting bracket (Figure 1, Item 5), carefully lift cylinder head (Figure 1, Item 6) straight up away from engine block.

4. Remove three bolts (Figure 1, Item 7), washers (Figure 1, Item 8), front lifting bracket (Figure 1, Item 4), and plate (Figure 1, Item 9).

5. Remove three bolts (Figure 1, Item 10), washers (Figure 1, Item 11), rear lifting bracket (Figure 1, Item 5), and plate (Figure 1, Item 12).

6. Remove gasket (Figure 1, Item 13).

END OF TASK

CLEANING

WARNING

Cleaning solvent is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with cleaning solvent. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply can cause injury or death to personnel.

1. Clean all parts with cleaning solvent.

CAUTION

Be careful not to gouge or scrape contact surface of cylinder head or engine block. Imperfections in contact surface may cause leakage of cylinder head gasket and equipment damage.

Contact surfaces of cylinder head and engine block must be thoroughly clean before installation or cylinder head gasket may leak and cause equipment damage.

2. Carefully remove all remnants of head gasket from bottom of head gasket and from top of engine block.

3. Measure contact surface of cylinder head for flatness using a feeler gage and straight edge. Maximum deviation should not exceed 0.002 in (0.05 mm) in a six inch area, or 0.006 in (0.15 mm) overall.

CLEANING - Continued

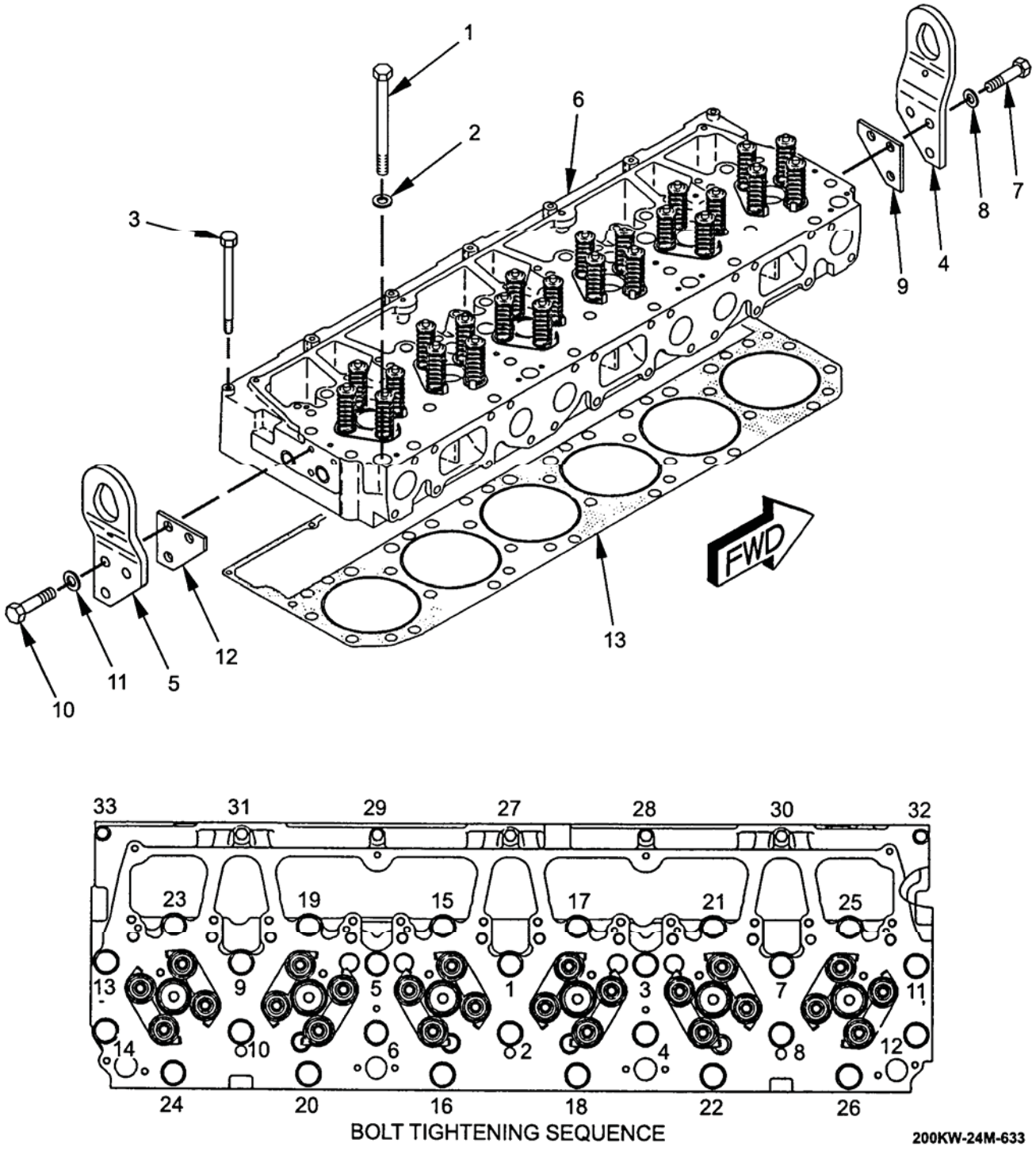

Figure 1. Cylinder Head.

END OF TASK

INSTALLATION

1. Install rear lifting bracket (Figure 1, Item 5) on cylinder head (Figure 1, Item 6) with plate (Figure 1, Item 12), four washers (Figure 1, Item 11) and bolts (Figure 1, Item 10).

2. Install front lifting bracket (Figure 1, Item 4) on cylinder head (Figure 1, Item 6) with plate (Figure 1, Item 9), four washers (Figure 1, Item 8) and bolts (Figure 1, Item 7).

3. Place gasket (Figure 1, Item 12) on engine block.

WARNING

Cylinder head weighs more than 300 pounds (135 kg) and requires an assistant and a suitable lifting device. Ensure proper lifting techniques are used when lifting cylinder head. Failure to comply can cause injury to personnel.

CAUTION

Cylinder head must be removed level and straight up, or damage will result.

4. With lifting device attached to front lifting bracket (Figure 1, Item 4) and rear lifting bracket (Figure 1, Item 5), carefully position cylinder head (Figure 1, Item 6) straight over engine block and carefully lower cylinder head onto engine block.

5. Apply engine oil to threads of seven bolts (Figure 1, Item 3).

6. Apply antiseize compound to threads of 26 bolts (Figure 1, Item 1) and both sides of 26 washers (Figure 1, Item 2).

7. Install seven bolts (Figure 1, Item 3). Install 26 washers (Figure 1, Item 2) and bolts (Figure 1, Item 1).

8. Using bolt tightening sequence shown, tighten bolts numbered 1 thru 26 by sequence to 107-129 lb-ft (145-175 Nm).

9. Re-tighten bolts numbered 1 thru 26 by sequence to 107-129 lb-ft (145-175 Nm).

10. Tighten bolts numbered 1 thru 26 by sequence an additional 90 degrees (1-1/2 hex flats).

11. Loosen bolts numbered 1 thru 26 to a torque of 0 lb-ft (0 Nm).

12. Repeat steps 8 thru 10.

13. Torque bolts numbered 27 thru 33 by sequence to 16-25 lb-ft (21-35 Nm).

14. Install rocker shaft and pushrods (WP 0119).

15. Install inlet manifold (WP 0116).

INSTALLATION - Continued

16. Install exhaust manifold (WP 0115).
17. Install fuel filter base (WP 0101).
18. Install valve cover and base (WP 0100).
19. Install thermostat housing (WP 0081).

END OF TASK

END OF WORK PACKAGE

CHAPTER 6

GENERAL SUPPORT
Moved to Sustainment (NMWR)

CHAPTER 7

SUPPORTING INFORMATION

CHAPTER 7

SUPPORTING INFORMATION

WORK PACKAGE INDEX

Title	WP Sequence No.
REFERENCES	0121
MAINTENANCE ALLOCATION CHART (MAC) INTRODUCTION	0122
MAINTENANCE ALLOCATION CHART (MAC)	0123
EXPENDABLE AND DURABLE ITEMS LIST	0124
LAMINATES	0125

FIELD AND SUSTAINMENT MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
REFERENCES

SCOPE

This work package lists all field manuals, forms, technical manuals, technical bulletins, and miscellaneous publications for use with the kW Tactical Quiet Generator.

FIELD MANUALS

FM 3-3	Chemical and Biological Contamination Avoidance
FM 3-3-1	Nuclear Contamination Avoidance
FM 3-11.4	NBC Protection
FM 3-11.5	NBC Decontamination
FM 3-97.6	Mountain Operations
FM 4-25.11	First Aid
FM 5-20	Camouflage
FM 9-207	Operation and Maintenance of Ordnance Materiel in Cold Weather (0° to –65°)
FM 10-67-1	Concepts and Equipment of Petroleum Operations
FM 10-564	Air Drop of Supplies and Equipment
FM 21-6	Techniques of Military Instruction
FM 21-30	Military Symbols
FM 21-40	Chemical, Biological, Radiological, and Nuclear Defense
FM 21-305	Manual for Wheeled Vehicle Driver
FM 31-70	Basic Cold Weather Manual
FM 31-71	Northern Operations

FORMS

AFTO Form 22	Technical Order Publication Improvement Report
AFR 66-1	Maintenance Reporting
DA Form 2028	Recommended Changes to Publications and Blank Forms
DA Form 2028-2	Recommended Changes to Equipment Technical Publications
NAVMC 10772	Recommended Changes to Publications and Blank Forms
DA Form 2062	Hand Receipt
DA Form 2404	Equipment Inspection and Maintenance Worksheet
DA Form 2407	Maintenance Request
DA Form 2408	Equipment Log Assembly (Records)
DA Form 2408-9	Equipment Control Record
DA Form 2408-20	Oil Analysis Log
DA Form 5988-E	Equipment Inspection and Maintenance Worksheet
DD Form 314	Preventive Maintenance Schedule and Record
DD Form 518	Accident Identification Card
DD Form 1397	Processing and Deprocessing Record for Shipment, Storage, and Issue of Vehicles and Spare Engines
DD Form 2326	Preservation and Packing Data
NAVMC10524	Consolidated Engineer Equipment Operations Log and Service Record

FORMS - Continued

NAVMC10560	Worksheet for Quarterly Preventive Maintenance and Technical Inspection for Engineer Equipment
NAVMC 10772	Tracking Program
SF Form 91	Motor Vehicle Accident Report
SF Form 361	Transportation Discrepancy Report
SF Form 364	Report of Discrepancy (ROD)
SF Form 368	Product Quality Deficiency Report

MISCELLANEOUS PUBLICATIONS

AR 190-13	Army Physical Security Program
AR 190-16	Physical Security
AR 385-11	Safety Ionizing Protection
AR 700-138	Army Logistics Readiness and Sustainability
AR 735-11-2	Reporting of Supply Discrepancies
AR 750-1	Army Materiel Maintenance Policy and Retail Maintenance Operations
AR 750-244-2	Procedures for Destruction of Electronics Materiel to Prevent Enemy Use
CTA 8-100	Army Medical Department Expendable/Durable Items
CTA 50-970	Expendable Items (Except Medical Class V, Repair Parts, and Heraldic Items)
TC 38-3	Guide for Basic Military Preservation and Packing
TC 9-237	Operator's Circular, Welding Theory and Application

PAMPHLETS

DA PAM 25-30	Consolidated Index of Publications and Blank Forms
DA PAM 750-8	Functional Users Manual for the Army Maintenance Management System (TAMMS)

TECHNICAL BULLETINS

TB 43-0209	Color, Marking, and Camouflage Painting of Military Vehicles, Construction Equipment, and Materials Handling Equipment
TB 43-0213	Corrosion Prevention and Control
TB ORD 1032	Description, Use, Bonding Techniques, and Properties of Adhesives

MILITARY STANDARDS AND SPECIFICATIONS

MIL-DTL-53072C	Chemical Agent Resistant Coating (CARC) System Application Procedures and Quality Control Inspection
MIL-PRF-2104	Lubricating Oil, Internal Combustion Engine, Combat/Tactical Service
MIL-L-21260	Lubricating Oil, Internal Combustion Engine, Preservative and Break-In
MIL-L-46167	Lubricating Oil, Internal Combustion Engine, Arctic
MIL-PRF-5624	Turbine Fuels, Aviation, Grades JP-4, JP-5, and JP-5/JP-8 ST
A-A-52557	Fuel Oil, Diesel
MIL-STD-913	Requirements for the Certification of Sling Loaded Military Equipment for External Transportation by Department of Defense Helicopters

DEPARTMENT OF DEFENSE (DOD) STANDARDS

DOD 4100-1-R	Department of Defense Materiel Management Regulations
DOD 4100-39-M	FLIS Program Manual

DETAIL SPECIFICATION

MIL-DTL 83133E	Turbine Fuels, Aviation, Kerosene Types NATO F-34 (JP-8), NATO F-35, and JP8+10

TECHNICAL MANUALS

TO 00-350-54	Unsatisfactory Equipment Reporting
TM 3-220	Chemical, Biological, and Radiological (CBR) Decontamination
TM 9-214	Inspection, Care, and Maintenance of Antifriction Bearings
TM 9-238	Deepwater Fording of Ordnance Material
TM 9-247	Materials Used for Cleaning, Preserving, Abrading, and Cementing Ordnance Material and Related Material Including Chemicals
TM 43-0139	Painting Instructions for Army Materiel
TM 4700-15	Operation and Maintenance of Ground Equipment
TM 55-1500-323-24	Installation Practices for Aircraft Electrical and Electronic Wiring
TM 740-90-1/TO 35-1-4	Administrative Storage of Equipment
TM 750-244-2	Procedures for Destruction of Electronics Materiel to Prevent Enemy Use
TM 9-6115-730-10	Operator Manual Tactical Quiet Generator Set, Skid Mounted, 200 kW, 50/60 Hz MEP-809A and Tactical Quiet Generator Set, Trailer Mounted, 200 kW, 50/60 Hz, PU-809A
TM 9-6115-730-24P	Repair Parts and Special Tools Lists for Tactical Quiet Generator Set, Skid Mounted, 200 kW, 50/60 Hz MEP-809A and Tactical Quiet Generator Set, Trailer Mounted, 200 kW, 50/60 Hz, PU-809A
TM 9-2330-376-14&P	Operator's, Organizational, DS, and GS Maintenance Manual Including Repair Parts and Special Tools Lists for Trailer, 5-Ton, 4-Wheel, GEMSS, XM979; Trailer, Flatbed: 5-Ton, 4-Wheel, XM1061/M1061A1; and Trailer, General Purpose, Flatbed: 7-1/2-Ton, XM1073

END OF WORK PACKAGE

FIELD AND SUSTAINMENT MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz
6115-01-296-1462 MEP-809A/6115-01-471-7085 PU-809A

MAINTENANCE ALLOCATION CHART (MAC) INTRODUCTION

INTRODUCTION

The Army Maintenance System MAC

This introduction provides a general explanation of all maintenance and repair functions authorized at various maintenance levels under the two-level Army Maintenance System concept.

The MAC (immediately following the introduction) designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component shall be consistent with the capacities and capabilities of the designated maintenance levels, which are shown on the MAC in column (4) as:

Field Level – includes three subcolumns, C (operator/crew), O (unit) maintenance, and F (direct support)

Sustainment Level – includes two subcolumns, H (general support) and D (depot).

The tools and test equipment requirements (immediately following the MAC) list the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from the MAC.

The remarks (immediately following the tools and test equipment requirements) contain supplemental instructions and explanatory notes for a particular maintenance function.

Maintenance Functions

Maintenance functions are limited to and defined as follows:

1. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound or feel). This includes scheduled inspection and gagings and evaluation of cannon tubes.
2. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards on a scheduled basis, i.e., load testing of lift devices and hydrostatic testing of pressure hoses.
3. Service. Operations required periodically to keep an item in proper operating condition; e.g., to mark (restore obliterated identification), to clean (includes decontaminate, when required), to preserve, to drain, to touchup paint, or to replenish fuel, lubricants, chemical fluids, or gases. This includes scheduled exercising and purging of recoil mechanisms.
4. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper position, or by setting the operating characteristics to specified parameters.
5. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

Maintenance Functions - Continued

6. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments of test, measuring, and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.
7. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.
8. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and assigned maintenance level is shown as the third position code of the Source, Maintenance and Recoverability (SMR) code.
9. Repair. The application of maintenance services, including fault location/troubleshooting, removal/installation, disassembly/assembly procedures, painting, and maintenance actions to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

NOTE

The following definitions are applicable to the "repair" maintenance function:

Services. Inspect, test, service, adjust, align, calibrate, and/or replace.

Fault location/troubleshooting. The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or Unit Under Test (UUT).

Disassembly/assembly. The step-by-step breakdown (taking apart) of a spare/functional group coded item to the level of its lowest component, that is assigned an SMR code for the level of maintenance under consideration (i.e., identified as maintenance significant).

Actions. Welding, grinding, riveting, straightening, facing, machining, and/or resurfacing.

10. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i.e., DMWR/NMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.
11. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (e.g., hours/miles) considered in classifying Army equipment/components.

Explanation of Columns in the MAC

Column (1) Group Number. Column (1) lists functional group code (FGC) numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the Next Higher Assembly (NHA).

Column (2) Component/Assembly. Column (2) contains the item names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

Column (3) Maintenance Function. Column (3) lists the functions to be performed on the item listed in column (2). (For a detailed explanation of these functions refer to "Maintenance Functions" outlined above.)

Explanation of Columns in the MAC - Continued

Column (4) Maintenance Level. Column (4) specifies each level of maintenance authorized to perform each function listed in column (3), by indicating work time required (expressed as man hours in whole hours or decimals) in the appropriate sub column. This work time figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function varies at different maintenance levels, appropriate work time figures are to be shown for each level. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the MAC. The symbol designations for the various maintenance levels under the two level maintenance concept are as follows:

Field:
C - Operator or Crew maintenance
O - Unit maintenance
F - Direct Support maintenance

Sustainment:
L - Specialized Repair Activity (SRA)
H - General Support maintenance
D - Depot maintenance

NOTE

The "L" maintenance level is not included in column (4) of the MAC. Functions to this level of maintenance are identified by a work time figure in the "H" column of column (4), and an associated reference code is used in the REMARKS column (6). This code is keyed to the remarks and the SRA complete repair application is explained there.

Column (5) Tools and Equipment Reference Code. Column (5) specifies, by code, those common tool sets (not individual tools), Common Test, Measurement and Diagnostic Equipment (TMDE), and special tools, special TMDE and special support equipment required to perform the designated function. Codes are keyed to the entries in the tools and test equipment table.

Column (6) Remarks Code. When applicable, this column contains a letter code, in alphabetical order, which is keyed to the remarks table entries.

Explanation of Columns in the Tools and Test Equipment Requirements

Column (1) Tool or Test Equipment Reference Code. The tool or test equipment reference code correlates with a code used in column (5) of the MAC.

Column (2) Maintenance Level. The lowest level of maintenance authorized to use the tool or test equipment under the two-level MAC.

Column (3) Nomenclature. Name or identification of the tool or test equipment.

Column (4) National Stock Number (NSN). The NSN of the tool or test equipment.

Column (5) Tool Number. The manufacturer's part number, model number, or type number.

Explanation of Columns in the Remarks

Column (1) Remarks Code. The code recorded in column (6) of the MAC.

Column (2) Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC.

END OF WORK PACKAGE

FIELD AND SUSTAINMENT MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz
6115-01-296-1462 MEP-809A/6115-01-471-7085 PU-809A

MAINTENANCE ALLOCATION CHART (MAC)

Table 1. MAC.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
GROUP	COMPONENT	MAINTENANCE	C	O	F	H	D	REF CODE TOOLS AND EQUIPMENT	REMARKS
00	200 kW Generator Set	None	N/A	N/A					
01	200 kW Generator Set Assembly	Inspect	0.5	0.5					
01	200 kW Generator Set Assembly	Inspect	0.5	0.5	1.0				
		Test			1.0			3	
	Quarterly	Service		8.0				1,2	
	Semi-Annual	Service		10.0					
	Annual	Service		16.0					
		Repair			2.0	8.0		3	
		Adjust			1.0				
0101	Housing Installation	Inspect	0.1	0.2					
	Door Assemblies	Repair		1.0					
	Ceiling Assemblies	Repair		3.0					
	Access Covers	Repair		1.0					
	Housing Assemblies	Repair		1.0					
	Panel Assemblies	Repair		1.0					
	Complete Assembly	Repair		7.0				1	A
0102	Control Box Assembly	Inspect	0.1	0.2					B
	Diode	Test		0.1					
		Replace		0.5					
	Load Sharing Module A4	Repair		1.0					R
	Digital Voltage Regulator A3	Repair		1.0					R
	Bus Transformer Box A6	Test		0.2					R
		Replace		0.8					
	AC Transformer Box A5	Test		0.2					
		Replace		0.8					
	Resistor Assembly A7	Repair		1.0					
	Switches	Replace		0.3					
		Test		0.2					
	Relay	Repair		0.5					
	Harness Assembly	Repair		5.0					
	Complete Assembly	Repair		11.2				1	B

Table 1. MAC - Continued.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
GROUP	COMPONENT	MAINTENANCE	C	O	F	H	D	REF CODE TOOLS AND EQUIPMENT	REMARKS
010201	Control Box Door			3.0				1	
	Panel Assembly	Replace							
	Generator Set Control			1.0				1	R
	A1	Repair							
	Alarm Module A2	Repair		1.0					
	Switches/Gauges	Test		0.2					
		Replace		0.2					
0103	Electrical Component			0.5					
	Installation	Inspect							
		Repair		2.0				1,2	
	Battery Disconnect								
	Switch	Repair		0.5					
	Batteries	Repair		1.0					
	Dead Crank Switch	Repair		0.5					
	NATO Slave	Repair							
	Receptacle			1.5					
	Main Load Contactor	Repair							
	K1			1.0					
	Engine to EMCP	Repair							
	Harness Assembly			3.0					
	Engine Harness	Repair							
	Assembly			16.0					
010301	Reconnection	Inspect	0.1	0.2					C
	Terminal Board								
		Replace		1.0				1	R
	Assembly	Repair		1.0				1	C
	Terminal Stud	Replace		0.5					R
	Complete Assembly	Repair		1.5				1	C
010302	Load Terminal Board	Inspect	0.1	0.1					
	Assembly								
	EMI Filter Assembly	Repair		1.0					
	L1, L2, and L3								
	EMI Filter Assembly N	Repair		1.0					D
	to Ground								
	Varistor Wire	Replace		0.2					R
	Terminal Stud	Replace		0.5					R
	Output Load Terminal	Repair		3.5					R
	Board TB2								
010303	Cable Assemblies	Inspect		1.5					E
	Battery Cable	Repair		0.5					
	Assemblies								
	Complete Assembly	Repair		3.0					
	Power Cable	Repair		16.0				1,2	E, R
	Assemblies								
	Fuel System								E
0104	Installation	Inspect	0.1	0.8					
	Fuel Level Switch	Repair		1.0					
	Assembly								
	Fuel Hose Assemblies	Replace		1.5					
	Fuel Pickup Tube	Repair							
	Assembly			1.0					
	Fuel Level Sender	Repair		1.0					
	Auxiliary Fuel Pump	Repair		1.0					
	Solenoid Valve	Repair		1.0					
	Hose Assemblies	Replace		0.5					
	Fuel Tank	Replace			25.0				

Table 1. MAC - Continued.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
GROUP	COMPONENT	MAINTENANCE	C	O	F	H	D	REF CODE TOOLS AND EQUIPMENT	REMARKS
0105	Cooling System	Inspect	0.2	0.2					
	Installation	Service	0.2	1.0				1	
	Surge Tank	Repair		0.5					
	Coolant Recovery Tank	Repair		0.5					
	Radiator	Repair		8.0					
	Engine Fan	Repair		2.0					
	Radiator Shrouds	Repair		2.0					
	Coolant Hoses	Repair		1.5					
0106	Exhaust System	Inspect	0.1	0.5					
	Muffler Inlet Tubes	Replace		0.5					
	Exhaust Muffler	Replace		1.0					
	Muffler Outlet Tubes	Replace		0.5					
	Complete Assembly			2.0					
	Air Cleaner								
0107	Installation	Inspect	0.1	0.1					
		Service		0.3				1	
		Repair		0.5					
	Complete Assembly	Replace		1.5					
	Crankcase Ventilation Filter	Replace		0.5					
0108	Engine/Generator	Inspect	0.1	0.1					
	Base Assembly	Repair			1.0	2.0		3	
010801	Generator	Inspect	0.1	0.5					
	Main Stator	Repair			22.0				
		Test			1.0				
	Exciter Stator	Repair			23.0				
		Test			0.5				
	Main Rotor	Repair			23.0				R
		Test			1.0				
	Complete Assembly	Replace			23.0			2,4	
010802	Engine	Inspect	0.2	0.5					R
	Engine	Replace			24.0				
	Pulley	Replace		2.0					G
	Water Line	Repair		1.5					
	Water Regulator	Repair		3.5					
	Water Regulator Housing	Repair		10.0					
	Water Pump	Replace		2.0					
	Starter	Repair		2.0					R
	Alternator	Repair		1.5					
	Engine Supports	Repair			12.0				
01080201	Engine Electrical System Consisting of								
		Inspect			0.2				
	Electronic Control Wiring Group	Repair			3.0				
	Injector Unit Wiring	Repair			6.0				H
	Sensor	Replace			1.5				
	Engine Control Module	Repair			3.0				R

Table 1. MAC - Continued.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
GROUP	COMPONENT	MAINTENANCE	C	O	F	H	D	REF CODE TOOLS AND EQUIPMENT	REMARKS
01080202	Engine Intake and Exhaust System	Inspect		0.5	0.5				R
	Turbocharger	Repair			2.5				
	Exhaust Manifold	Repair			3.0				I
	Intake Manifold	Repair			5.0				
01080203	Engine Oil System	Inspect		0.1	0.2				
	Oil Pan	Replace			25.0				
	Oil Pump	Repair			3.0				J
	Oil Filter	Replace		0.5					
	Oil Cooler	Repair			1.5				
	Oil Filler	Replace		0.5					
01080204	Engine Fuel System	Inspect			0.2				
	Injection Fuel	Repair			3.0				K
	Primary Fuel Pump	Repair		0.5					
	Fuel Transfer	Repair			3.0				
	Fuel Filter and Line	Repair		1.5					
01080205	Engine Cylinder Head Assembly	Inspect			0.2				
	Valve cover	Replace			2.5				
	Valve Mounting	Repair			3.5				
	Cylinder Head	Replace			8.5				L
01080206	Engine Flywheel and Housing Assembly	Inspect			0.2				
	Flywheel	Replace			25.0				
	Flywheel Housing	Replace			25.0				M
01080207	Engine Crankshaft Pulley	Inspect			0.2				
		Repair			1.0			3	
	Crankshaft Pulley	Repair							
	Crankshaft Damper	Repair							N
	Crankshaft Seals	Repair							
	Crankshaft	Repair							
01080208	Engine Timing Gear Cover	Inspect				0.2			
		Repair				1.0		3	
	Front Housing	Repair							
	Front Gear	Repair							O
01080209	Engine Block Assembly	Inspect				0.2			
		Repair				1.0		3,4	
	Camshaft	Repair							
	Piston Group	Repair							P
	Block Group	Repair							

Table 1. MAC - Continued.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT	DEPOT		
GROUP	COMPONENT	MAINTENANCE	C	O	F	H	D	REF CODE TOOLS AND EQUIPMENT	REMARKS
03	Winterization Kit Installation	Inspect	0.2	0.2					
		Replace		0.5				1	
		Repair		3.1					Q
		Repair			1.0			1	
04	Trailer Installation	Repair		1.0				1	

Table 2. Tools and Test Equipment Requirements.

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL STOCK NUMBER	TOOL NUMBER
1	O	Tool Kit, General Mechanic's, Automotive (GMTK)	5180-00-177-7033	SC 5180-95-N26 (01 September 2001)
2	O F H	Shop Equipment, Automotive Maintenance and Repair; Organizational Maintenance, Common No. 1, Less Power	4910-00-754-0654	SC 4910-95-A74 (01 September 2001)
3	F H	Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power	4910-00-754-0705	SC 4910-95-A31 (01 September 2001)
4	F H	Lifting Strap, 2000 lb. capacity	XXX	EE2801

Table 3. Remarks.

REMARKS CODE	REMARKS
A	Housing Installation repair function includes replacement of Right Battery Access Door Assembly, Left Battery Door Assembly, Control Box Door Assembly, Left Front Door Assembly (Latch), Left Rear Door Assembly, Left Rear Door Assembly (Latch), Load Board Door Assembly, Right Front Door Assembly (Latch), Right Rear Door Assembly, Right Rear Door Assembly (Latch), Engine Generator Compartment Ceiling Assembly, Access Cover Assembly, Generator Access Cover Assembly, Front Section Housing Assembly, Rear Section Housing Assembly, Front Roof Section Housing Assembly, Rear Roof Section Housing Assembly, Left Center Panel Assembly, Right Center Panel Assembly, Right Rear Panel Assembly, and Left Rear Panel Assembly.
B	Control Box Assembly repair function includes replacement of Resistor Assembly A7 and Control Box Harness Assembly.
C	Reconnection Terminal Board Assembly inspection and repair functions include inspection and replacement of Reconnection Terminal Board.
D	Load Terminal Board Assembly repair function includes replacement of EMI Filter Assembly L1, L2, and L3, EMI Filter Assembly N to Ground, Varistor Wire L1, Varistor Wire L2, Varistor Wire L3, and Varistor Wire N.
E	Cables Assemblies inspect, service, and repair functions include inspection, servicing, and replacement of Battery Cable Assembly 12A, Battery Cable Assembly 24D, Battery Cable Assembly 1 C, Battery Cable Assembly 2A, Battery Cable Assembly 1A, Battery Cable Assembly 24A, Battery Cable Assembly 2C, Power Cable Assembly 110K, Power Cable Assembly 121A, Power Cable Assembly 122A, Power Cable Assembly 123A, Power Cable Assembly 103A, Power Cable Assembly 102A, and Power Cable Assembly 101 A.
F	Fuel System Installation inspect and repair functions include inspection and replacement of Fuel Level Switch Assembly, Hose Assembly, Hose Assembly, Hose Assembly, Hose Assembly, Hose Assembly, Fuel Pickup Tube Assembly, and Hose Assembly.
G	Engine repair function includes repair and adjustment of Alternator Mounting Group, Pulley Group, Fan Drive Group, Fan Drive Mounting Group, Water Line Group, Water Regulator Group, Water Regulator Housing Group, Water Pump Group, Air Compressor Cover Group, Starter Group, and Engine Support Group
H	Engine Electrical System repair function includes repair of Electronic Control Wiring Group, Injector Unit Wiring Group, and Electronic Control Mounting Group
I	Engine Intake and Exhaust System repair function includes inspection and repair of Turbocharger Group, Exhaust Manifold Group, and Intake Manifold Group
J	Engine Oil System repair function includes inspection and repair of Oil Pan Group, Oil Pump Group, Oil Filter Group, Oil Cooler Group, Oil Filler Group, Oil Gage Group, and Oil Sampling Group
K	Engine Fuel System repair function includes inspection and repair of Priming Fuel Pump Group, Injection Fuel Group, Primary Fuel Group, Fuel Transfer Group, and Fuel Injection Group

Table 3. Remarks - Continued.

REMARKS CODE	REMARKS
L	Engine Cylinder Head Assembly repair function includes inspection and repair of Valve Mounting Group and Cylinder Head Group
M	Engine Flywheel and Housing Assembly repair function includes inspection and repair of Flywheel Group and Flywheel Housing Group
N	Engine Crankshaft Pulley repair function includes inspection and repair of Crankshaft Pulley Group, Crankshaft Damper Group, Crankshaft Seal Group, and Crankshaft Group
O	Engine Timing Gear Cover repair function includes inspection and repair of Front Housing Group and Front Gear Group
P	Engine Block Assembly repair function includes inspection and repair of Camshaft Group, Piston Group, and Block Group
Q	Winterization Kit Installation repair function includes replacement of Winterization Wiring Harness, Winterization Wiring Harness, Winterization Resistor Assembly, Winterization Diode Assembly, and Winterization Thermostat Assembly.

END OF WORK PACKAGE

FIELD AND SUSTAINMENT MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-807A/PU-807A
EXPENDABLE AND DURABLE ITEMS LIST

INTRODUCTION

This work package lists expendable and durable items that you will need to operate and maintain the 200 kW Tactical Quiet Generator. This list is for information only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V Repair Parts, and Heraldic Items), CTA 50-909, Field and Garrison Furnishings and Equipment, or CTA 8-100, Army Medical Department Expendable/Durable Items.

EXPENDABLE/DURABLE ITEMS LIST COLUMN DESCRIPTIONS (TABLE 1)

Column (1) - ITEM NUMBER. This number is assigned to the entry in the list and is referenced in the narrative instructions to identify the item (e.g., Use adhesive (WP 0133, Item 4)).

Column (2) - LEVEL. This column identifies the lowest level of maintenance that requires the listed item (C = Operator/Crew, O = Unit, F = Direct Support, H = General Support, D = Depot).

Column (3) - NATIONAL STOCK NUMBER (NSN). This is the NSN assigned to the item which you can use to requisition it.

Column (4) - ITEM NAME, DESCRIPTION, PART NUMBER/(CAGEC). This column provides the other information you need to identify the item. The last line below the description is the part number and the Commercial and Government Entity Code (CAGEC) (in parentheses).

Column (5) - U/I. Unit of Issue (U/I) code shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

Table 1. Expendable and Durable Items List.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, PART NUMBER/(CAGEC)	(5) U/I
1	F	8030-00-597-5367	Antiseize Compound 2-1/2 lb can MIL-A-907 (81349)	CN
2	F	8030-01-451-1403	Antiseize Compound 5P3931 (11083)	TU
3	F	8030-00-117-8510	Adhesive 10 cc bottle RTV 3145 Clear (71984)	BT
4	F	6810-00-286-5435	Alcohol, Technical 1 gallon can TT-I-735 (81348)	CN

Table 1. Expendable and Durable Items List - Continued.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, PART NUMBER/(CAGEC)	(5) U/I
5	C	6850-00-664-1403	Antifreeze, Ethylene Glycol 1 gallon A-A-52624 (58536)	GL
6	O	5340-00-450-5718	Cap and Plug Set Protective 10935405 (19207)	KT
7	H	6850-00-543-7801	Carbon Removing Compound, Type II 5 gallon can MIL-C-19853 (81349)	CN
8	F	6850-00-281-1985	Cleaning Solvent 1 gallon can PS-661 (02978)	CN
9	O	5350-00-221-0872	Cloth, Abrasive Crocus A-A-1206 (58536)	PG
10	F		Damping Sheet Adhesive Back 0116-1957-01 (93742)	SH
11	F		Damping Sheet Adhesive Back 0116-1957-02 (93742)	SH
12	F		Damping Sheet Adhesive Back 0116-1957-03 (93742)	SH
13	F		Damping Sheet Adhesive Back U-127U-PSA (69202)	SH
14	F		Damping Sheet Adhesive Back U-381 U-PSA (69202)	SH
15	F		Damping Sheet Adhesive Back V-05 (69202)	SH
16	C	9140-00-286-5286	Fuel, Diesel, DF-1 bulk A-A-52557 (58536)	GL

Table 1. Expendable and Durable Items List - Continued.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, PART NUMBER/(CAGEC)	(5) U/I
17	C	9140-00-286-5294	Fuel, Diesel, DF-2 bulk A-A-52557 (58536)	GL
18	H	9150-01-035-5391	Gear Lubricating Oil 5 gallon can MIL-PRF-2105 (81349)	CN
19	O	9150-01-197-7689	Grease, Automotive and Artillery 6.5 lb can MIL-PRF-10924 (81349)	CN
20	H	9150-00-223-4004	Grease, Molybdenum Disulfide 6-1/2 lb can MIL-G-21164 (81349)	CN
21	C	6850-01-287-8067	Inhibitor, Corrosion, Liquid Cooling System 1 gallon MIL-A-53009 (81349)	GL
22	O	5970-00-815-1300	Insulation Sleeving Electrical MIL-I-23053/5 (81349)	FT
23	C	9150-01-402-2372	Lubricating Oil, Engine, Arctic, OEA 5 gallon can MIL-PRF-46167 (81349)	CN
24	C	9150-01-189-6727	Lubricating Oil, Engine, OE/HDO-10 1 quart MIL-PRF-2104 (81349)	QT
25	C	9150-01-186-6668	Lubricating Oil, Engine, OE/HDO-10 5 gallon MIL-PRF-2104 (81349)	CN
26	C	9150-00-186-6681	Lubricating Oil, Engine, OE/HDO-30 1 quart MIL-PRF-2104 (81349)	QT
27	C	9150-00-188-9858	Lubricating Oil, Engine, OE/HDO-30 5 gallon MIL-PRF-2104 (81349)	CN
28	C	9150-01-152-4117	Lubricating Oil, Engine, OE/HDO-15/40 1 quart MIL-PRF-2104 (81349)	QT

Table 1. Expendable and Durable Items List - Continued.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, PART NUMBER/(CAGEC)	(5) U/I
29	C	9150-01-152-4119	Lubricating Oil, Engine, OE/HDO-15/40 5 gallon MIL-PRF-2104 (81349)	CN
30	C	9150-00-405-2987	Lubricating Oil, Engine, OE/HDO-40 1 gallon MIL-PRF-2104 (81349)	GL
31	O	9150-00-111-0209	Lubricating Oil, Engine, Preservation, Grade 30W 5 gallon MIL-PRF-21260 (81349)	CN
32	O	9150-00-111-3199	Lubricating Oil, Engine, Preservation, Grade 10W 5 gallon MIL-PRF-21260 (81349)	CN
33	O	9150-00-231-6689	Lubricating Oil, General Purpose 1 quart can MIL-PRF-32033 (81349)	CN
34	O	9150-00-250-0926	Petroleum Jelly 1 lb can VV-P-236 (81348)	CN
35	O	7920-00-205-3571	Rag, Wiping, Cotton and Cotton Synthetic Grade B DDD-R-0030 (81348)	BX
36	O	8040-01-108-6660	Repair Kit Adhesive 900M-195 (73168)	KT
37	F	8030-00-981-7005	Sealant Locktite AA15-1 (05972)	
38	F	8030-00-656-1426	Sealant, Silicone 1 pint can MIL-S-45180 (81349)	CN
39	F	5330-01-485-8999	Sealer High Temperature 2P-2333 (11083)	
40	F	8040-01-173-9815	Sealing Compound 12 oz. tube RTV-108 (01139)	TU
41	H	8030-01-025-1692	Sealing Compound 250 cc bottle Locktite 242 (05972)	BT

Table 1. Expendable and Durable Items List - Continued.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, PART NUMBER/(CAGEC)	(5) U/I
42	F	8030-00-148-9833	Sealing Compound, Thread Locking, Type II, Grade N 10 cc bottle MIL-S-46163 (81349)	BT
43	O	8030-01-063-7510	Sealing Compound, Thread Locking, Type I Grade L 50 cc bottle MIL-S-46163 (80244)	BT
44	F	3439-00-974-1873	Solder, Tin Alloy, SN60WRMAP2 1 lb spool QQ-571 E (81348)	LB
45	O	6850-01-378-0679	Solvent, Cleaning Compound 5 gallon can BREAKTHROUGH (OK209)	CN
46	O	5975-01-128-0390	Strap, Tiedown Electrical PLT-27 (06383)	HD
47	O	5975-01-364-7334	Strap, Tiedown Electrical PLT.7M-C (06383)	HD
48	O	5975-01-376-6480	Strap, Tiedown Electrical PLT1.51 (06383)	HD
49	O	9905-00-537-8954	Tag, Marker 50 each bundle MIL-T-12755 (81349)	BD
50	O	7510-00-073-1337	Tape, Pressure Sensitive Adhesive, 3/4 in. W 60 yd Roll PPP-T-60 (81348)	RL
51	C	9130-00-273-2379	Turbine Fuel, Aviation bulk, JP5 MIL-PRF-5624 (81349)	GL
52	C	9130-01-031-5816	Turbine Fuel, Aviation bulk, JP8 MIL-T-83133 (81349)	GL
53	O	9505-00-684-4841	Wire, nonelectrical, 0.031 in. dia 1 lb roll ASTM A641 (81346)	RL

END OF WORK PACKAGE

FIELD AND SUSTAINMENT LEVEL MAINTENANCE

TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A

LAMINATES

INITIAL SETUP:

Tools and Special Tools

None

Personnel Required

None

References

None

Materials/Parts

None

INTRODUCTION

Laminates are fielded with each 200kW Generator Set. These laminates are often lost or damaged and the user must try to locate a replacement. This work package lists all of the laminates used on the 200kW Tactical Quiet Generator. It is designed so that lost or damaged laminates may be pulled from the Technical Manual, reproduced and then laminated for use. The needed page is then placed back into the manual for future use.

200KW LAMINATE TABLE OF CONTENTS

PAGE NUMBER(S)	DASH NUMBER(S)	TITLE	REFERENCE DWG NO.
0125-3	-01	200KW LAMINATE TABLE OF CONTENTS	N/A
0125-4	-01	BLANK	N/A
0125-5 - 0125-8	-02,-03	200KW GEN SET CONTROL (GSC) FAULT CODES	N/A
0125-9	-04	SCHEMATIC AND WIRING DIAGRAM LEGEND	0116-1273
0125-10 -0125-11	-04,-05	AC SCHEMATIC	0116-2277
0125-12 -0125-13	-05,-06	200KW DC SCHEMATIC	0116-2276
0125-14 -0125-18	-06,-07,-08	CONTROL BOX WIRING DIAGRAM	0116-1274
0125-19 -0125-20	-09	200KW ENGINE WIRING DIAGRAM	0116-2275
0125-21 -0125-24	-10,-11	TQG 200KW 50/60HZ MEP-809A/PU809A REPROGRAMMING INSTRUCTIONS	N/A
0125-25 -0125-26	-12	100/200 KW ENGINE HARNESS SCHEMATIC LEGEND	N/A
0125-27 -0125-28	-13	200KW ENGINE HARNESS SCHEMATIC DIAGRAM	N/A
0125-29 -0125-31	-14,-15	200KW ENGINE SENSOR LOCATIONS	N/A
0125-32	-15	BLANK	N/A

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200kW Generator Set Control (GSC) Alarm Fault Codes	
AL1 – High Water Temperature	AL10 – Generator Under Frequency
AL2 – Low Water Temperature	AL11 – Generator Reverse Power
AL3 – Low Engine Oil Pressure	AL12 – Phase Over Current
AL4 – Fault Detected by Engine ECM	AL13 – Generator Total Over Current
AL5 – Low Engine Coolant Level	AL14 – Phase A No Voltage Input
AL6 – High Engine Oil Temperature	AL15 – GSC Configuration Error
AL7 – Generator Over Voltage	AL16 – Incorrect Phase Sequence
AL8 – Generator Under Voltage	AL17– Improper Generator or Bus Voltage
AL9 – Generator Over Frequency	AL18 – Synchronizer Time–out

200kW Generator Set Control (GSC) SP Fault Codes	
SP1 – Low Fuel Level	SP3 – When relay K1 is energized and one or both of the following is true for more than 2 seconds an SP3 fault is announced. The difference in frequency between the generator and the bus is greater than 0.2 Hz. The difference in phase between the generator and the bus is greater than 10 degrees. The GSC will then stop the synchronization process until the fault is cleared and corrected.
SP2–DVR FAULT	SP4 – Input is active when 208 or 416 VAC is detected on the load bus by relay DBLO or DBHI. This input is compared to the reading of the bus voltage (P7–17 and P7–18). If the voltage of phase A is less than 20% of the rated voltage, it is considered to be "dead". If the condition of these measurements is different with regards to presence or absence of bus voltage, a fault is announced.

200kW Digital Voltage Regulator (DVR) Alarm Fault Codes	
601 – Internal Memory Failure Alarm	704 – Reverse VAR Shutdown
602 – Internal Watchdog Failure Alarm	705 – Reverse Power Shutdown
603 – Rotating Diode Failure Alarm	801 – Instantaneous Trip Shutdown
604 – Reverse VAR Alarm	802 – Loss of Sensing Shutdown
701 – Undervoltage Shutdown	803 – Loss of Frequency Shutdown
702 – Overvoltage Shutdown	9xx – Severe Fault. There are several possible failures in the 900's. All require replacement of the DVR.
703 – Overexcitation Shutdown	

PN: 0116–2912–02 REV G

200kW Generator Set Control (GSC) Fault Codes, including Engine Control Module (ECM) Codes And Event Codes Codes Sorted in CID Number Sequence	
CID 1 E FMI 11 Cylinder 1 Failure mode is not identifiable (Mechanical Failure) (Logged)	CID 100 E FMI 03 Engine Oil Pressure Sensor Voltage above normal (Logged)
CID 2 E FMI 11 Cylinder 2 Failure mode is not identifiable (Mechanical Failure) (Logged)	CID 100 E FMI 04 Engine Oil Pressure Sensor Voltage below normal (Logged)
CID 3 E FMI 11 Cylinder 3 Failure mode is not identifiable (Mechanical Failure) (Logged)	CID 110 FMI 02 Engine Coolant Temperature Sensor Erratic, intermittent, or incorrect signal (Logged)
CID 4 E FMI 11 Cylinder 4 Failure mode is not identifiable (Mechanical Failure) (Logged)	CID 110 FMI 03 Engine Coolant Temperature Sensor Voltage above normal (Logged)
CID 5 E FMI 11 Cylinder 5 Failure mode is not identifiable (Mechanical Failure) (Logged)	CID 110 FMI 04 Engine Coolant Temperature Sensor Voltage below normal (Logged)
CID 6 E FMI 11 Cylinder 6 Failure mode is not identifiable (Mechanical Failure) (Logged)	CID 111 FMI 03 Engine Low Coolant Sensor Voltage above normal
CID 9 E FMI 02 High Altitude Derate (Active Only)	CID 168 E FMI 02 Electrical System Voltage Erratic, intermittent
CID 41 E FMI 03 Above normal 8 Volt Power Supply Failure mode is not identifiable (Mechanical Failure) (Logged) (8 volt supply not used)	CID 168 E FMI 03 Electrical System Voltage Above Normal
CID 41 E FMI 04 Below normal 8 Volt Power Supply Failure mode is not identifiable (Mechanical Failure) (Logged) (8 volt supply not used)	CID 168 E FMI 04 Electrical System Voltage Below Normal
CID 85 E FMI 01 Shutdown Overriden (Logged Only)	CID 169 E FMI 01 Engine Oil Maintenance Required
CID 91 E FMI 08 PWM Throttle Position Sensor Abnormal frequency, pulse width, or period (Not Logged)	CID 170 E FMI 01 Fuel Filter Change Required
CID 94 E FMI 03 Fuel Pressure Sensor Voltage above normal (Logged)	CID 172 E FMI 03 Inlet Air Temperature Sensor Data is Valid but Above Normal Operating Range (Logged)
CID 94 E FMI 04 Fuel Pressure Sensor Voltage data is valid but below normal operating mode (Logged)	CID 172 E FMI 04 Inlet Air Temperature Sensor Failure Data is Valid but Below Normal Operating Range (Logged)
CID 96 E FMI 01 High Fuel Pressure Warning (Active and Logged)	CID 174 E FMI 03 Fuel Temperature Sensor Data is Valid but Above Normal Operating Range (Logged)
CID 97 E FMI 01 Derate Overriden (Logged Only)	CID 174 E FMI 04 Fuel Temperature Sensor Data is Valid but Below Normal Operating Range (Logged)
CID 100 E FMI 02 Engine Oil Pressure Sensor Erratic, intermittent, or incorrect signal (Logged)	CID 190 FMI 02 Magnetic Pickup Unit Erratic, Intermittent, or Incorrect Signal (Logged)

200kW Generator Set Control (GSC) Fault Codes, including Engine Control Module (ECM) Codes And Event Codes Codes Sorted in CID Number Sequence	
CID 190 FMI 03 Magnetic Pickup Unit Voltage Above Normal (Logged)	CID 274 FMI 04 Atmospheric Pressure Sensor Voltage Below Normal
CID 190 E FMI 02 Primary Engine Speed/Timing Sensor Erratic, Intermittent, or Incorrect Signal (Logged)	CID 334 FMI 03 Spare Output (P7–36) Voltage Above Normal
CID 190 E FMI 11 Primary Engine Speed/Timing Sensor Failure mode not identifiable (Mechanical Failure) (Logged)	CID 334 FMI 04 Spare Output (P7–36) Voltage Below Normal
CID 198 E FMI 01 Low Fuel Pressure Warning (Logged)	CID 336 E FMI 02 Engine Control Switch Erratic, Intermittent, or Incorrect Signal
CID 248 FMI 09 CAT Data Link Abnormal Update	CID 342 E FMI 02 Secondary Engine Speed/Timing Sensor Erratic, Intermittent, or Incorrect Signal (Logged)
CID 253 E FMI 02 Personality Module Erratic, Intermittent, or Incorrect Signal	CID 342 E FMI 11 Secondary Engine Speed/Timing Sensor Failure mode is not identifiable (Mechanical Failure) (Logged)
CID 254 E FMI 12 Engine Control Module Self Test Failed Component	CID 360 E FMI 01 Low Engine Oil Pressure Warning (Active and Logged)
CID 261 E FMI 13 Engine Timing (cal) Device is not calibrated	CID 360 E FMI 02 Low Engine Oil Pressure Derate (Active and Logged)
CID 262 E FMI 03 5 Volt Sensor Power Supply Voltage Above Normal	CID 360 E FMI 03 Low Engine Oil Pressure Shutdown (Active and Logged)
CID 262 E FMI 04 5 Volt Sensor Power Supply Voltage Below Normal	CID 361 E FMI 01 High Engine Coolant Temperature (Active and Logged)
CID 264 E FMI 03 E–Stop Shutdown (Active Only)	CID 361 E FMI 02 High Engine Coolant Derate (Active and Logged)
CID 268 FMI 02 GSC Electronic Control Erratic, Intermittent, or Incorrect Signal	CID 361 E FMI 03 High Engine Coolant Shutdown (Active and Logged)
CID 269 FMI 03 GSC 8V Sensor Power Supply Voltage Above Normal	CID 362 E FMI 01 Overspeed Warning (Active and Logged)
CID 269 FMI 04 GSC 8V Sensor Power Supply Voltage Below Normal	CID 362 E FMI 03 Overspeed Shutdown (Active and Logged)
CID 273 FMI 03 Turbo Outlet Pressure Sensor Voltage Above Normal	CID 368 E FMI 01 High Inlet Air Temperature Warning (Active and Logged)
CID 273 FMI 04 Turbo Outlet Pressure Sensor Voltage Below Normal	CID 391 E FMI 01 Inlet Air Restriction Warning (Active and Logged)
CID 274 FMI 03 Atmospheric Pressure Sensor Voltage Above Normal	CID 441 FMI 12 GSC Electronic Governor Relay (A1K1) Failed Component

200kW Generator Set Control (GSC) Fault Codes, including Engine Control Module (ECM) Codes And Event Codes Codes Sorted in CID Number Sequence	
CID 442 FMI 12 GSC Generator Fault Relay (A1K2) Failed Component	CID 858 FMI 04 Close Breaker Output Voltage Below Normal
CID 443 FMI 12 GSC Crank Termination Relay (A1K3) Output (External contacts not used) Failed Component	CID 1038 FMI 03 Speed Adjust 1 Output Voltage Above Normal
CID 444 FMI 12 GSC Starting Motor Relay (A1K4) Failed Component	CID 1038 FMI 04 Speed Adjust 1 Output Voltage Below Normal
CID 445 FMI 12 GSC Run Relay (A1K5) Failed Component	CID 1167 FMI 04 K1 Sense Input (P7–25) Voltage Below Normal
CID 447 FMI 12 GSC Fuel Control Relay (A1K7) Output (External contacts not used) Failed Component	CID 1168 FMI 03 Dead Bus Sensor Voltage Above Normal
CID 448 FMI 12 GSC Programmable Spare Relay (A1K8) Failed Component	CID 1168 FMI 04 Dead Bus Sensor Voltage Below Normal
CID 500 FMI 12 GSC Failed Component	CID 1169 FMI 02 AC Transformer Box (ATB) Sensor Erratic, Intermittent, or Incorrect Signal
CID 545 FMI 05 Ether Control Relay Current Low / Open Circuit	CID 1170 FMI 02 Bus Transformer Box (BTB) Sensor Erratic, Intermittent, or Incorrect Signal
CID 545 FMI 06 Ether Control Relay Current High / Grounded	CID 1170 FMI 04 Bus Transformer Box (BTB) Sensor Voltage Below Normal
CID 566 FMI 07 Unexpected Shutdown Improper Mechanical Response	CID 1170 FMI 08 Bus Transformer Box (BTB) Sensor Abnormal frequency, pulse width, or period
CID 590 FMI 09 Engine Electronic Control Abnormal Update	CID 1589 E FMI 03 Turbocharger Air Inlet Pressure Sensor Voltage Above Normal
CID 770 FMI 09 Customer Communication Module (Not used) Abnormal Update	CID 1589 E FMI 04 Turbocharger Air Inlet Pressure Sensor Voltage Below Normal
CID 858 FMI 03 Close Breaker Output Voltage Above Normal	

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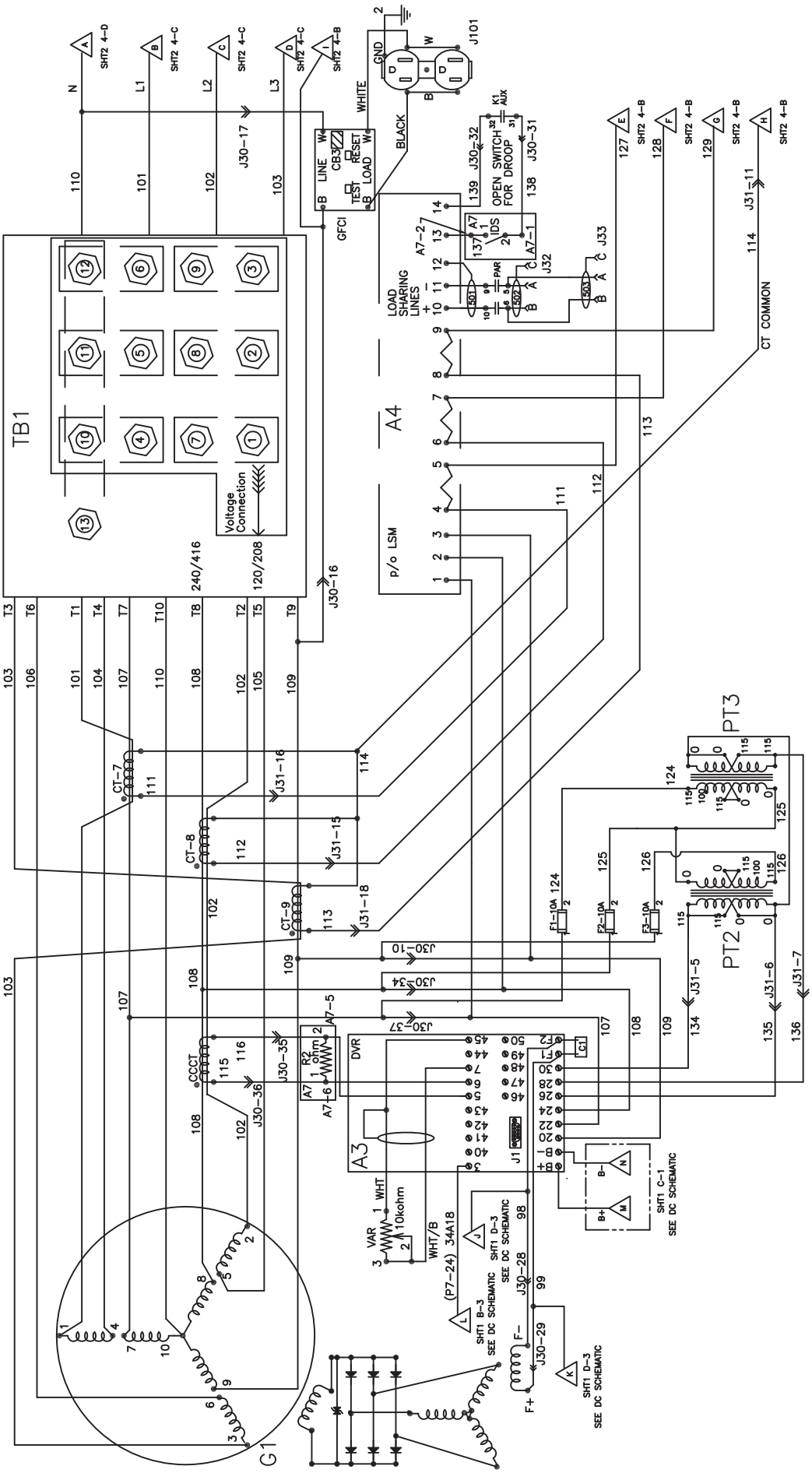
SCHEMATIC AND WIRING DIAGRAM LEGEND

REFERENCE DESIGNATION	ITEM DESCRIPTION
A1	GENERATOR SET CONTROLLER PLUS PARALLEL OPTION (GSC & P)
A2	CUSTOM ALARM MODULE (CAM)
A3	DIGITAL VOLTAGE REGULATOR (DVR)
A4	LOAD SHARING MODULE (LSM)
A5	"A" TRANSFORMER BOX SIGNAL CONDITIONER FOR GSC+P (ATB)
A6	"B" TRANSFORMER BOX SIGNAL CONDITIONER FOR GSC+P (BTB)
A7	AUXILIARY PANEL RESISTOR ASSY
A8	ENGINE CONTROL MODULE (ECM)
ALM	ALARM
AR	ALARM RESET
ALT	ALTERNATOR
AS	ALARM SILENCE SWITCH
AFP	AUXILIARY FUEL PUMP
AFPS	AUXILIARY FUEL PUMP SWITCH
AFPR	AUXILIARY FUEL PUMP RELAY
AFPV	AUXILIARY FUEL PUMP SOLENOID VALVE
BDS	BATTERY DISCONNECT SWITCH
BSS	BATTLE SHORT SWITCH
CATSW1	FUEL FILTER CHANGED
CATSW2	OIL FILTER CHANGED
CB1	DC POWER CIRCUIT BREAKER
CB2	PINION SOLENOID CIRCUIT BREAKER
CB3	CIRCUIT BREAKER AND GFCI PROTECTION FOR CONVENIENCE RECEPTACLE
CB4	ADEM POWER CIRCUIT BREAKER
CB5	ALTERNATOR CIRCUIT BREAKER
CCCT	CROSS CURRENT COMPENSATION (OR DROOP) TRANSFORMER
CCL	CONTACTOR CLOSED LIGHT
CCS	CONTACTOR CONTROL SWITCH
CDR	COOL DOWN RELAY
CT1, CT2, CT3	CURRENT TRANSFORMERS, LOAD OUTPUT
CT7, CT8, CT9	CURRENT TRANSFORMER, LOAD SHARING
CTR	CRANK TERMINATION RELAY
D1	DIODE MAIN POWER 1N1186 OR EQUIVALENT
D2	DIODE DEAD CRANK BLOCKING 3 AMP 1N5404
D3	DIODE FIELD FLASH BLOCKING 3 AMP 1N5404
D4	DIODE BLOCKING BREAKER CLOSURE 3 AMP 1N5404
DBHI	DEAD BUS RELAY HIGH VOLTAGE SENSING
DBLO	DEAD BUS RELAY LOW VOLTAGE SENSING
DCA	DC AMMETER
DCS	DEAD CRANK SWITCH
ECS	ENGINE CONTROL SWITCH (MASTER)
ENG HTR	ENGINE HEATER
ESPB	EMERGENCY STOP PUSH BUTTON
F1, F2, F3	FUSE, POTENTIAL TRANSFORMERS
FCR	FUEL CONTROL RELAY
FL1	LOW LEVEL FUEL ALARM SWITCH
FL2A	AUX FUEL PUMP "OFF" SWITCH
FL2B	AUX FUEL PUMP "ON" SWITCH
FLG	FUEL LEVEL GAUGE
FLSU	FUEL LEVEL SENDING UNIT
FLT1, FLT2, FLT3, FLT4	FILTER, E.M.I.
G1	GENERATOR
GFCI	GROUND FAULT CIRCUIT INTERRUPTER, CONVIENCE RECEPTACLE
GFR	GENERATOR FAULT RELAY
GND	GROUND
HTR1, HTR2	HEATER RESISTOR WINTERIZATION
IDS	ISOCHRONOUS DROOP SW

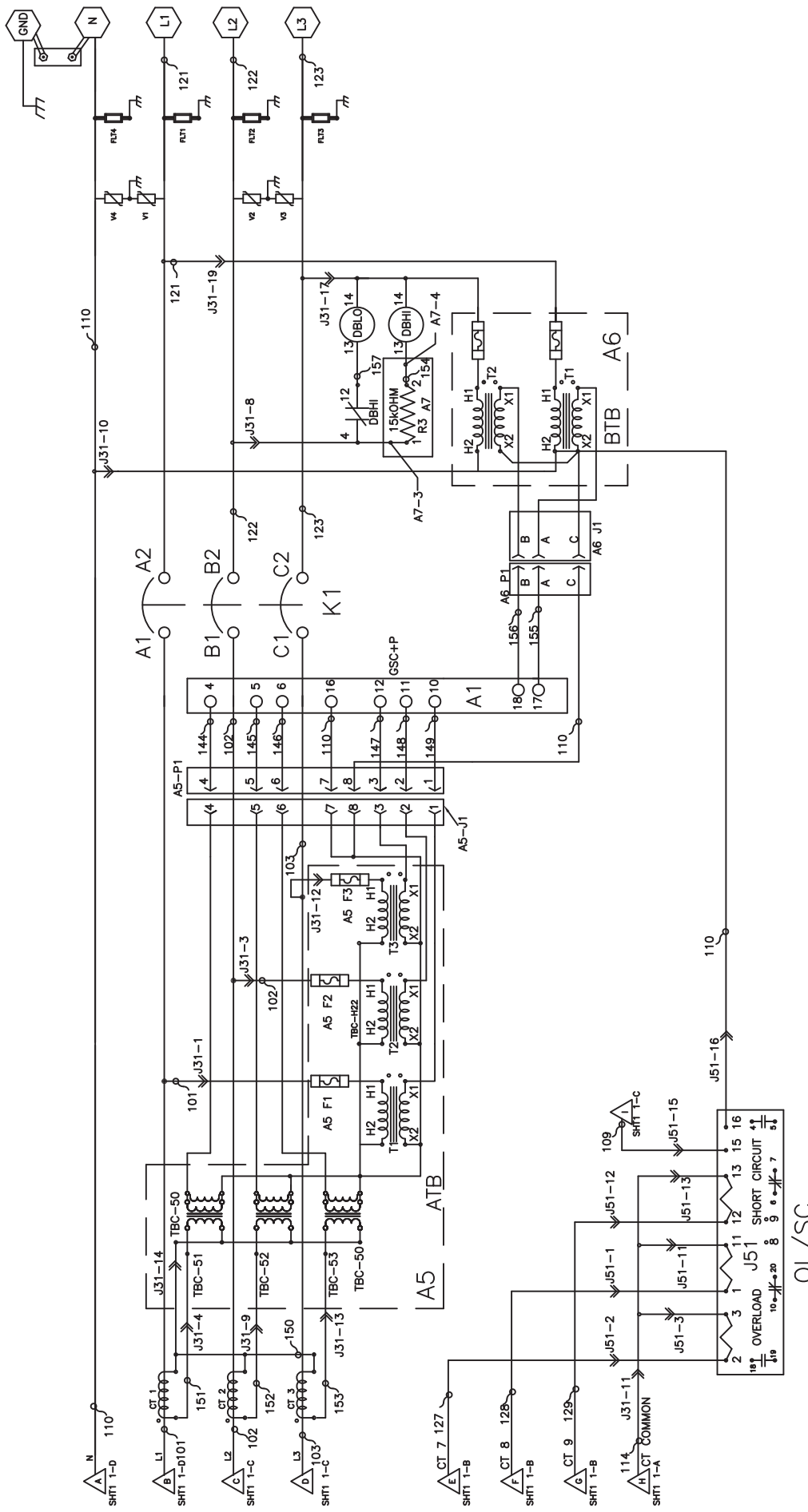
REFERENCE DESIGNATION	ITEM DESCRIPTION
J7	A1 CONNECTOR
J8	FUEL SWITCH PUMP CONTROL
J11	FUEL SWITCH LOW LEVEL SHUTDOWN
J30	CONNECTOR, CONTROL BOX 37 PIN
J31	CONNECTOR, CONTROL BOX 19 PIN
J32, J33	CONNECTOR, PARALLELING
J37	CONNECTOR, CONTROL BOX
J101	CONVENIENCE RECEPTACLE
K1	MAIN LOAD CONTACTOR
KFF	RELAY FIELD FLASH
KAFP	RELAY AUXILIARY FUEL PUMP
KR	MAIN CONTACTOR RELAY
L1, L2, L3	LOAD LEADS
LCL	LOW COOLANT LEVEL SENSOR
LFL	LOW FUEL LEVEL
LT	LAMP TEST SWITCH
MAN	MANUAL
MPU	MAGNETIC SPEED PICKUP
N	NEUTRAL
NEU	NEUTRAL
OL/SC	OVERLOAD / SHORT CIRCUIT MODULE
P8	FUEL SWITCH PUMP CONTROL
P11	FUEL SWITCH LOW LEVEL SHUTDOWN
P7	A1 CONNECTOR
P30	CONTROL BOX 37 PIN
P31	CONTROL BOX 19 PIN
P32	PARALLEL CABLE PLUGS
P37	CONTROL BOX /A1 CONNECTOR
PS	PINION SOLENOID (STARTER SOLENOID)
PSR	PROGRAMMABLE SPARE RELAY
PT2, PT3	POTENTIAL TRANSFORMERS FOR POWER INPUT TO A3 (DVR)
PL1, PL2, PL3	PANEL ILLUMINATION LIGHT
PLS	PANEL LIGHT SWITCH
PSU	PARALLEL / SINGLE UNIT SWITCH
R1	RESISTOR FIELD FLASH 15 OHM DIGIKEY (TMC-25-15-ND)
R2	RESISTOR VOLTAGE DROOP 1 OHM DIGIKEY (TMC-50-1.0-ND)
R3	RESISTOR DEAD BUS 15K OHM (OHMITE 825F15K)
R4	DC AMMETER SHUNT
RM	RELAY MODULE
RR	RUN RELAY
SM	STARTER MOTOR
SMMS	STARTER MOTOR MAGNETIC SWITCH
SMR	STARTER MOTOR RELAY
SMS	SYNCHRONIZING MODE SELECTOR SWITCH
SRY	SLAVE RELAY
SR	SLAVE RECEPTACLE
SSP	SPEED SETTING POTENTIOMETER
T1-T10	GENERATOR LINE LEADS
TB1	GENERATOR RECONNECTION BOARD
TB2	LOAD CONNECTION BOARD
TB5	TERMINAL STRIP (ENGINE GENERATOR)
V1, V2, V3, V4	VARISTOR
VAR	VOLTAGE ADJUST RHEOSTAT

AC SCHEMATIC

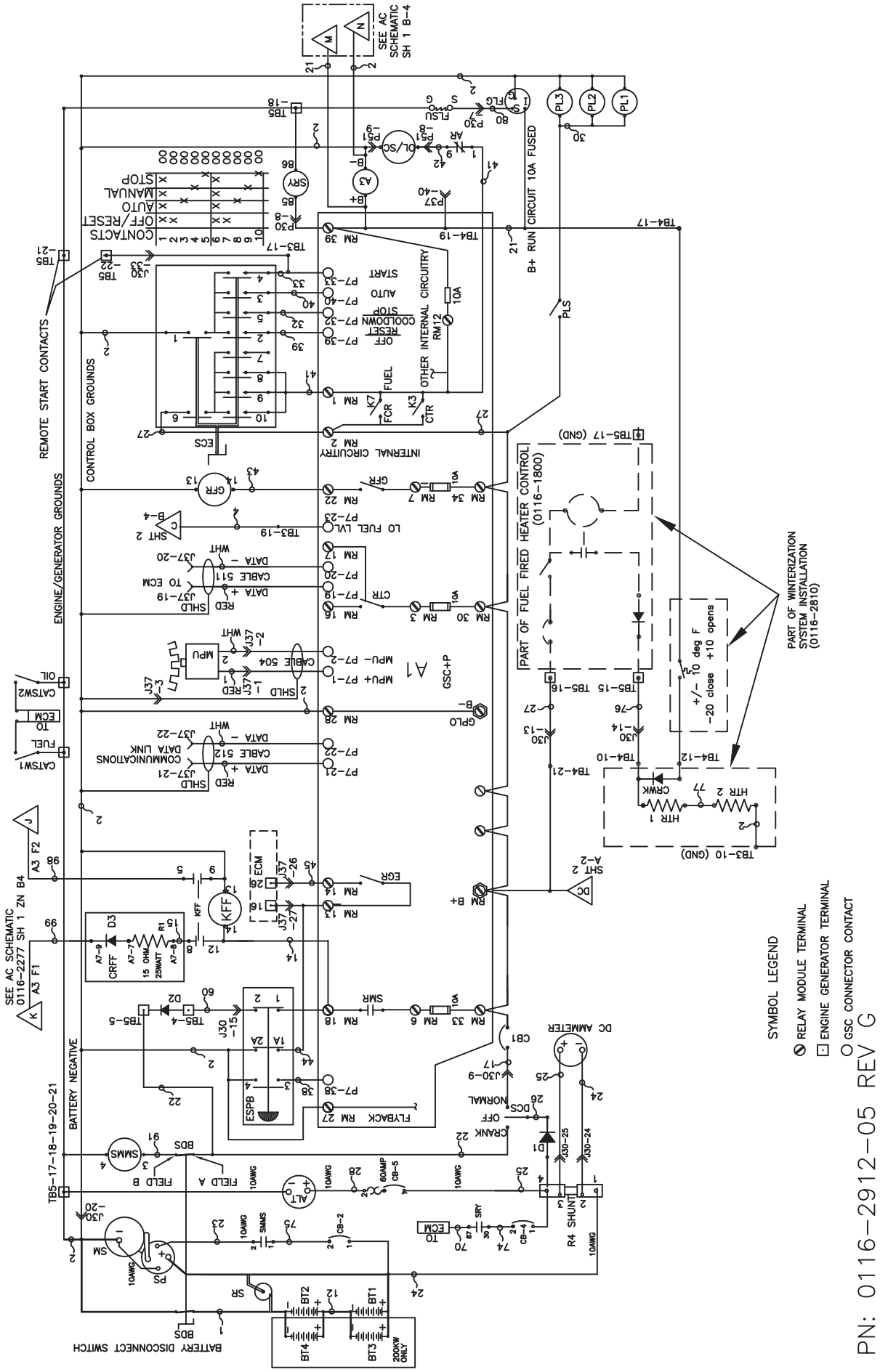


PN: 0116-2912-04 REV G

AC SCHEMATIC



200 KW DC SCHEMATIC



SYMBOL LEGEND

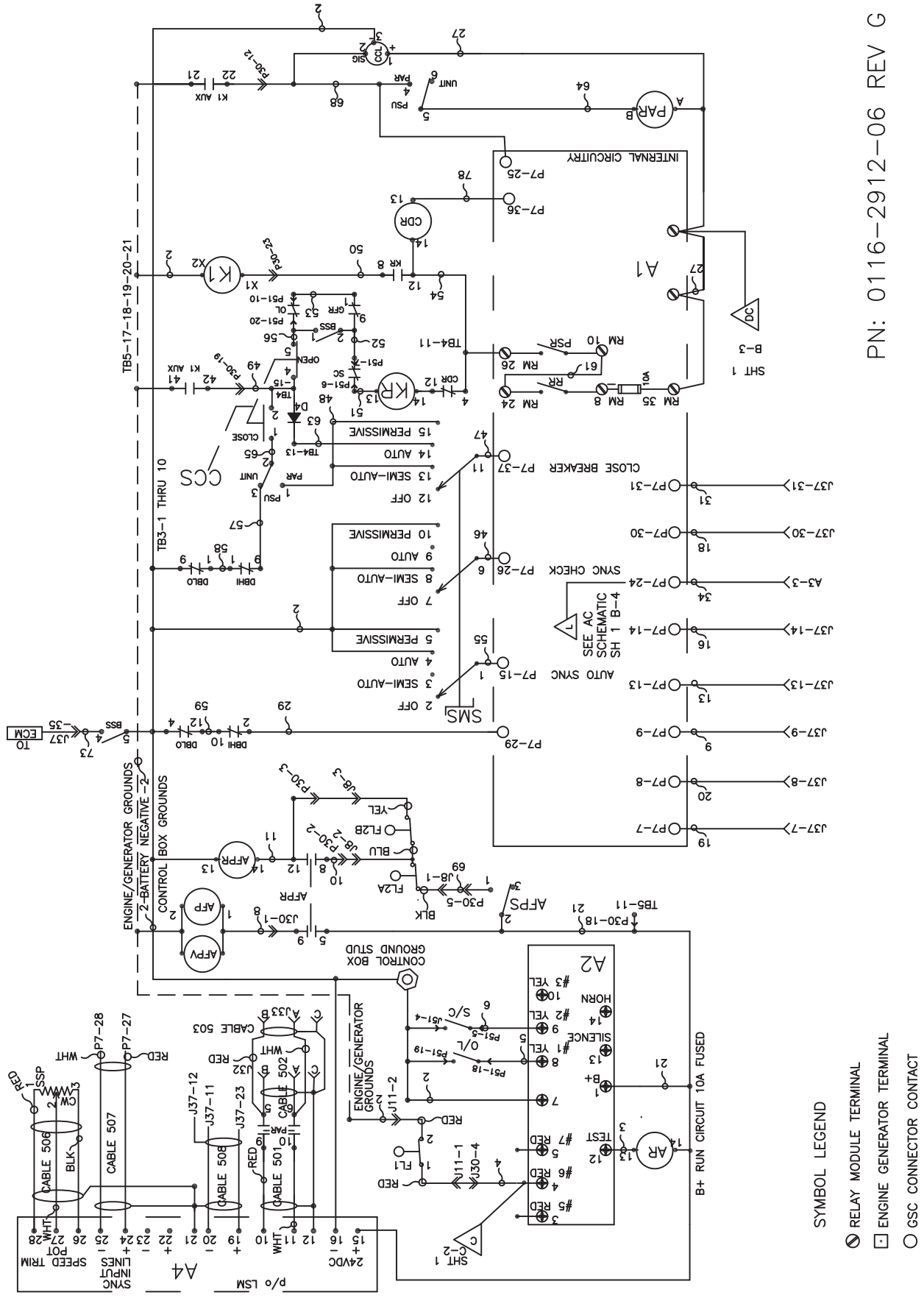
⊘ RELAY MODULE TERMINAL

⊡ ENGINE GENERATOR TERMINAL

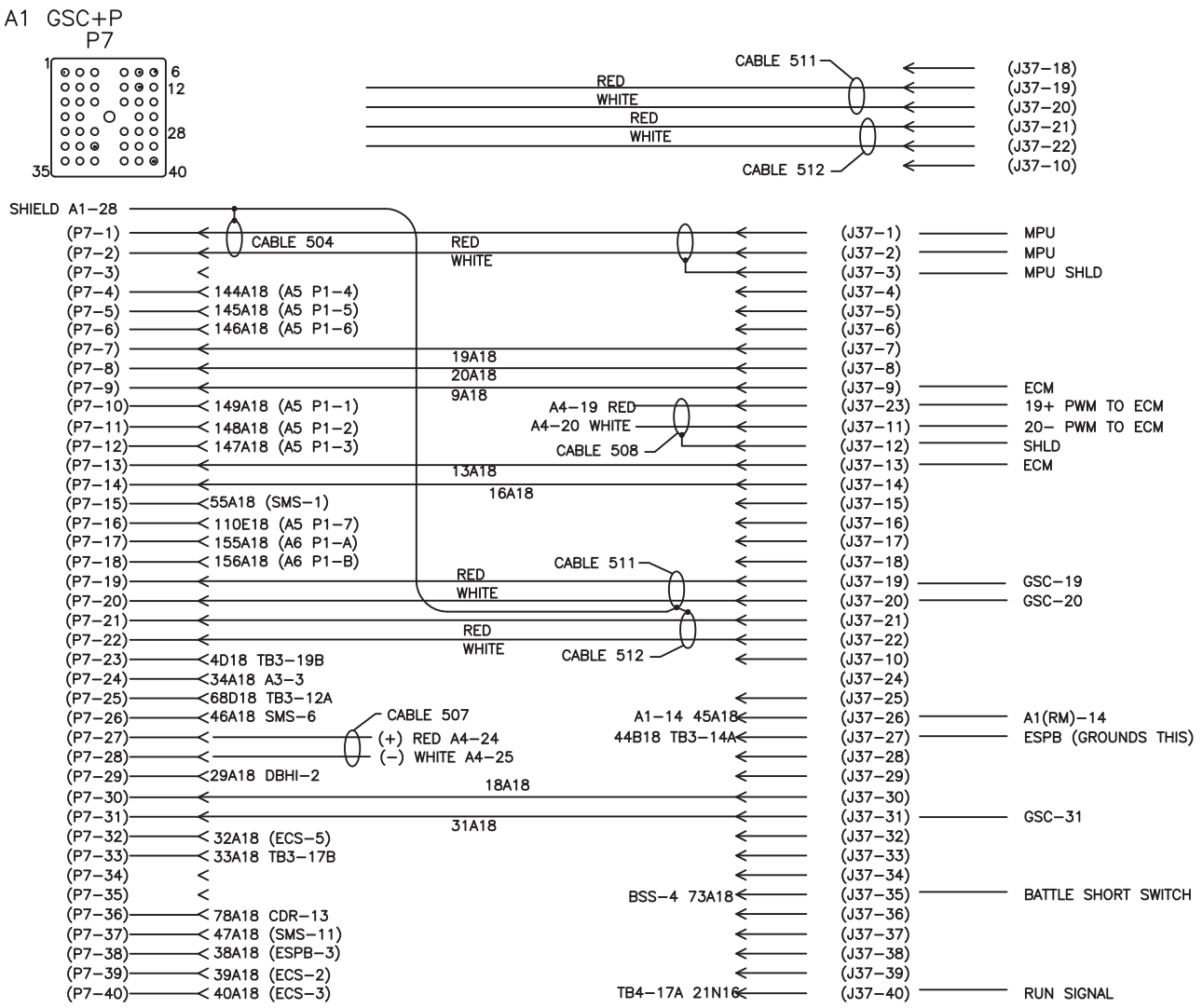
○ GSC CONNECTOR CONTACT

PN: 0116-2912-05 REV G

200 KW DC SCHEMATIC

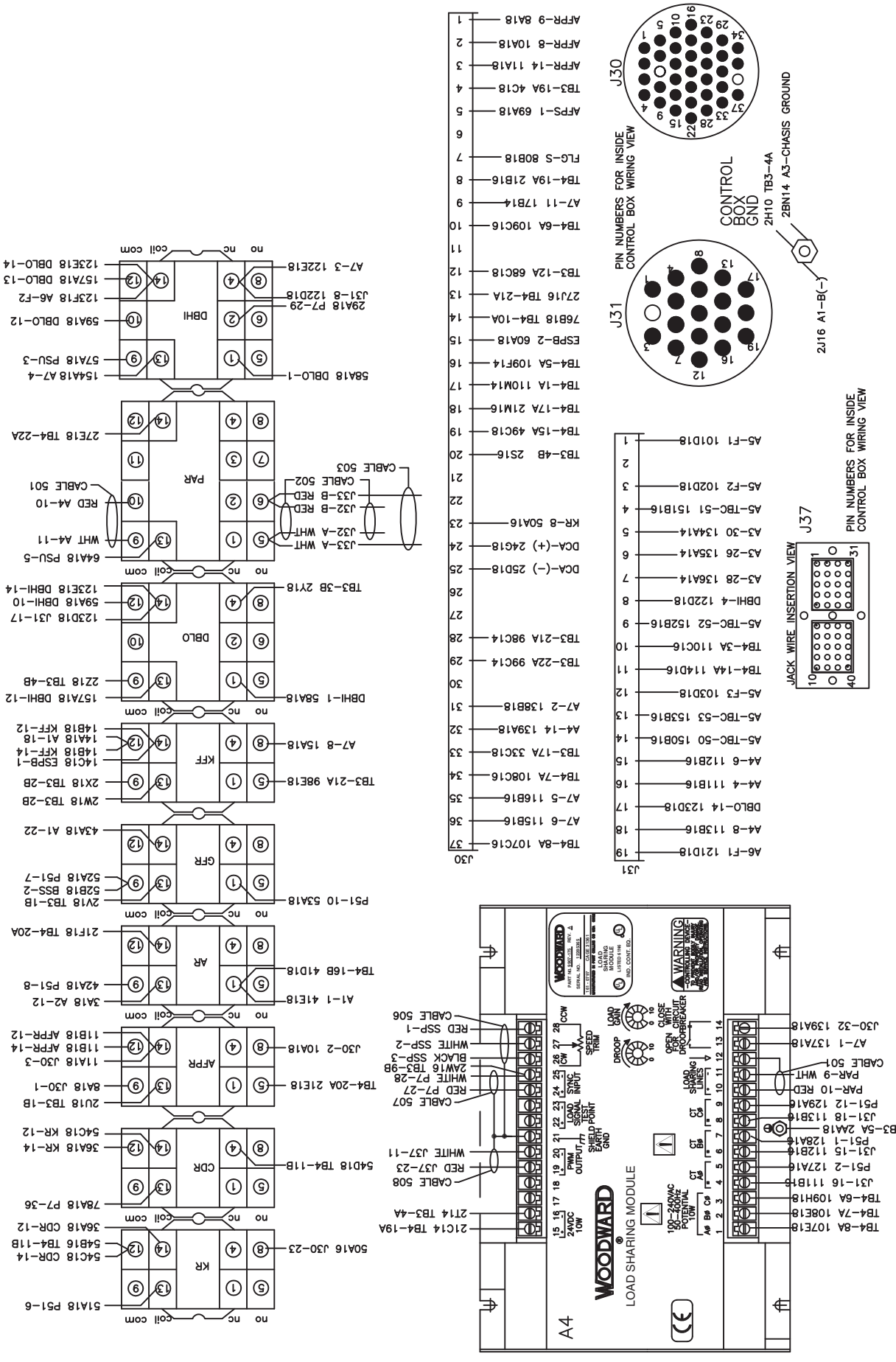


CONTROL BOX WIRING DIAGRAM

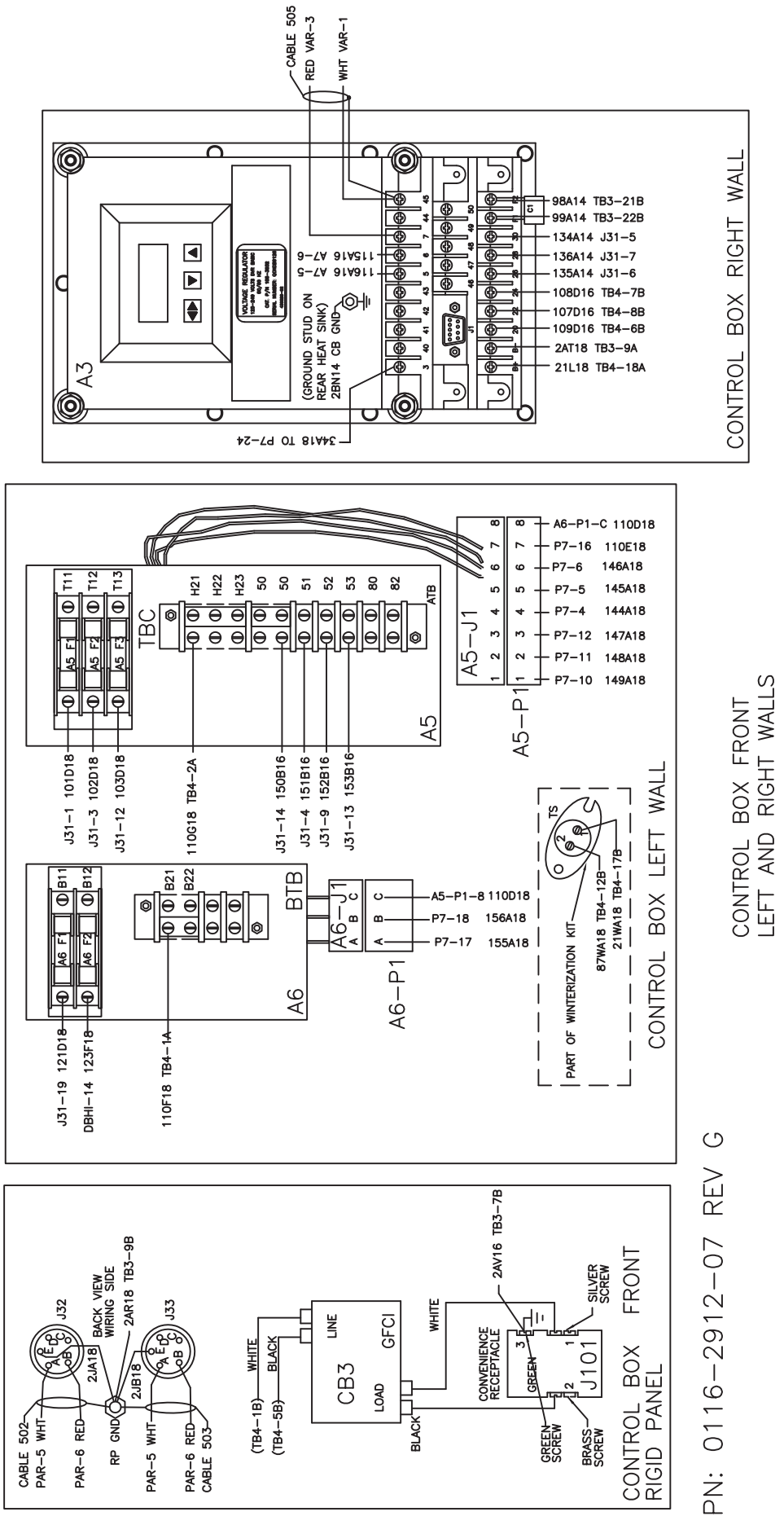


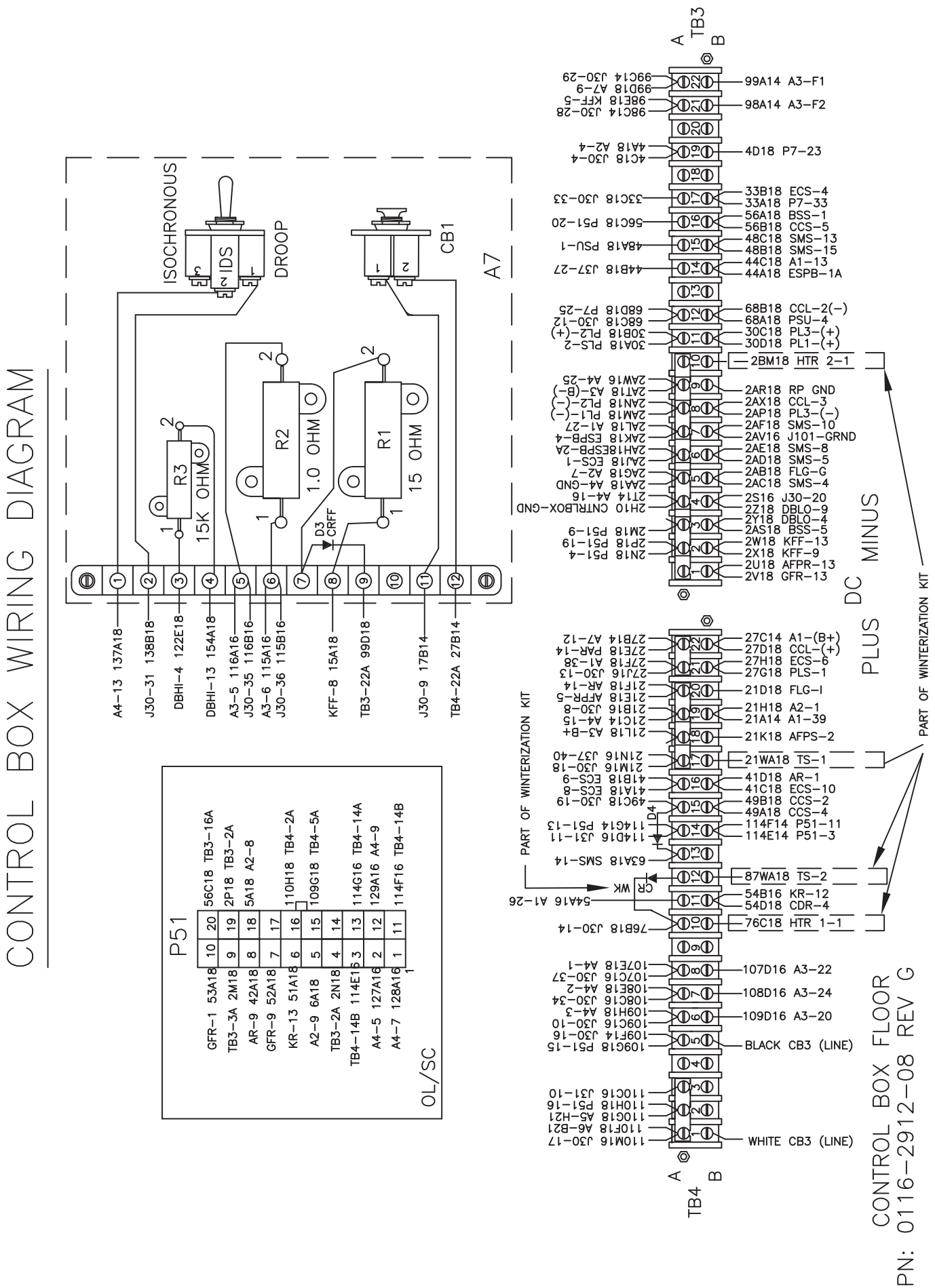
PN: 0116-2912-06 REV G

CONTROL BOX WIRING DIAGRAM

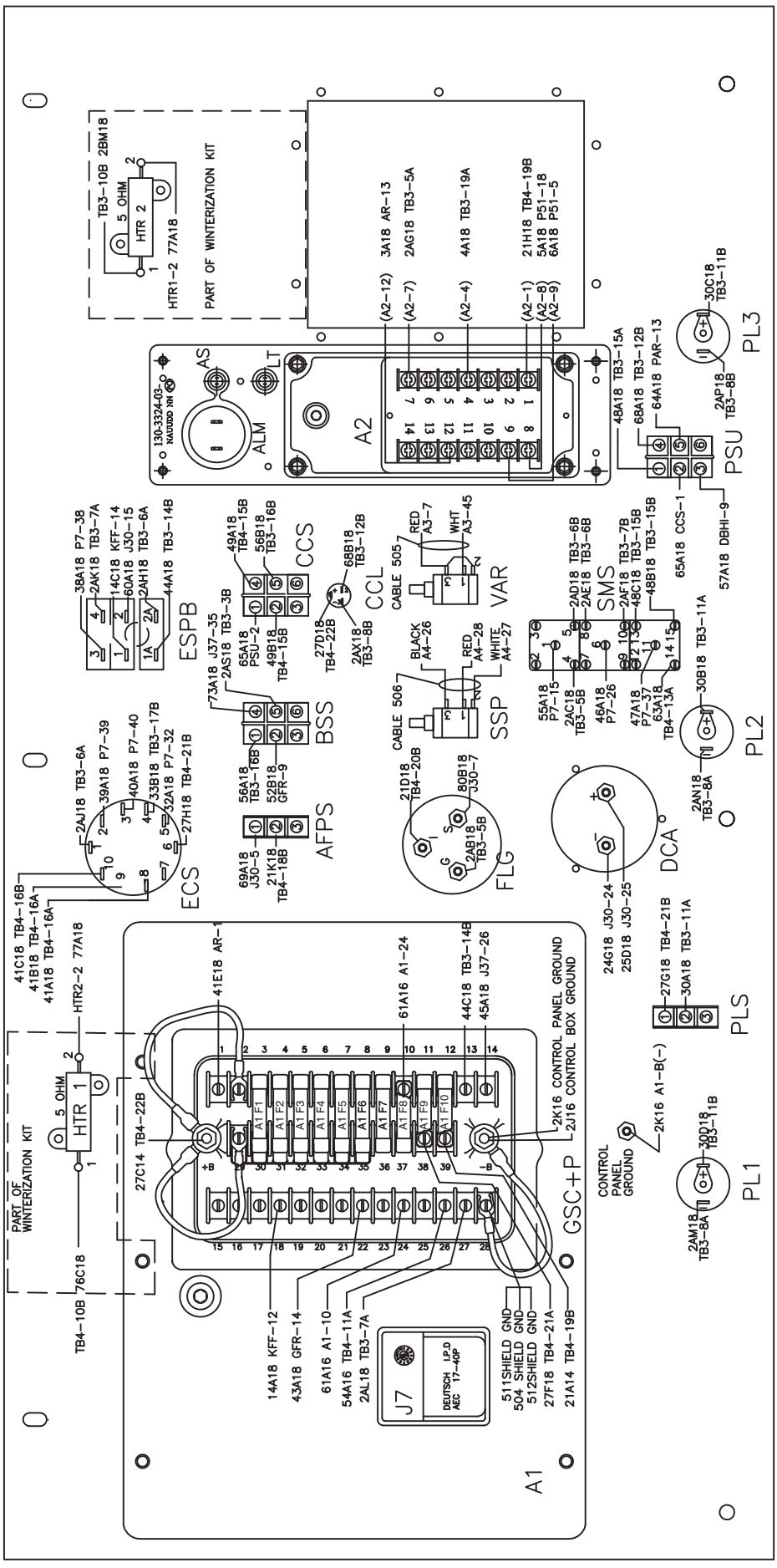


CONTROL BOX WIRING DIAGRAM




CONTROL BOX WIRING DIAGRAM
A7
ISOCHRONOUS
IDS
DROOP
CB1
R3
15K OHM
R2
1.0 OHM
R1
15 OHM
D3
CRFF
A4-13 137A18
J30-31 138B18
DBHI-4 122E18
DBHI-13 154A18
A3-5 116A16
J30-35 116B16
A3-6 115A16
J30-36 115B16
KFF-8 15A18
TB3-22A 99D18
J30-9 17B14
TB4-22A 27B14
P51
GFR-1 53A18
TB3-3A 2M18
AR-9 42A18
GFR-9 52A18
KR-13 51A18
A2-9 6A18
TB3-2A 2N18
TB4-14B 114E16
A4-5 127A16
A4-7 128A16
56C18 TB3-16A
2P18 TB3-2A
5A18 A2-8
110H18 TB4-2A
109G18 TB4-5A
114G16 TB4-14A
129A16 A4-9
114F16 TB4-14B
OL/SC
TB3
99C14 J30-29
99D18 A7-9
98E18 KFF-5
98C14 J30-28
4A18 A2-4
4C18 J30-4
33C18 J30-33
56C18 P51-20
48A18 PSU-1
44B18 J37-27
68D18 P7-25
68C18 J30-12
30B18 PL2-(+)
30A18 PLS-2
2AW16 A4-25
2AT18 A3-(B-)
2AN18 PL2-(-)
2AM18 PL1-(-)
2AL18 A1-27
2AK18 ESPB-4
2AH18ESPB-2A
2AJ18 ECS-1
2AG18 A2-7
2AA18 A4-GND
2114 A4-16
2H10 CNTRLBOX-GND
2M18 P51-9
2P18 P51-19
2N18 P51-4
99A14 A3-F1
98A14 A3-F2
4D18 P7-23
33B18 ECS-4
33A18 P7-33
56A18 BSS-1
56B18 CCS-5
48C18 SMS-13
48B18 SMS-15
44C18 A1-13
44A18 ESPB-1A
68B18 CCL-2(-)
68A18 PSU-4
30C18 PL3-(+)
30D18 PL1-(+)
2BM18 HTR 2-1
2AR18 RP GND
2AX18 CCL-3
2AP18 PL3-(-)
2AF18 SMS-10
2AV16 J101-GRND
2AE18 SMS-8
2AD18 SMS-5
2AB18 FLG-G
2AC18 SMS-4
2S16 J30-20
2Z18 DBLO-9
2Y18 DBLO-4
2AS18 BSS-5
2W18 KFF-13
2X18 KFF-9
2U18 AFPR-13
2V18 GFR-13
DC MINUS
27B14 A7-12
27E18 PAR-14
27F18 A1-38
27J16 J30-13
21F18 AR-14
21E18 AFPR-5
21B16 J30-8
21C14 A4-15
21L18 A3-B+
21K18 AFPS-2
21N16 J37-40
21M16 J30-18
41B18 ECS-9
41A18 ECS-8
49C18 J30-19
114D16 J31-11
63A18 SMS-14
54A16 A1-26
76B18 J30-14
27C14 A1-(B+)
27D18 CCL-(+)
27H18 ECS-6
27G18 PLS-1
21D18 FLG-I
21H18 A2-1
21A14 A1-39
21WA18 TS-1
41D18 AR-1
41C18 ECS-10
49B18 CCS-2
49A18 CCS-4
114G14 P51-13
114F14 P51-11
114E14 P51-3
87WA18 TS-2
54B16 KR-12
54D18 CDR-4
76C18 HTR 1-1
PLUS
PART OF WINTERIZATION KIT
PART OF WINTERIZATION KIT
D4
WK
CR
107E18 A4-1
107C16 J30-37
108E18 A4-2
108C16 J30-34
109H18 A4-3
109C16 J30-10
109F14 J30-16
109G18 P51-15
107D16 A3-22
108D16 A3-24
109D16 A3-20
BLACK CB3 (LINE)
110C16 J31-10
110H18 P51-16
110G18 A5-H21
110F18 A6-B21
110M16 J30-17
WHITE CB3 (LINE)
TB4
CONTROL BOX FLOOR
PN: 0116-2912-08 REV G

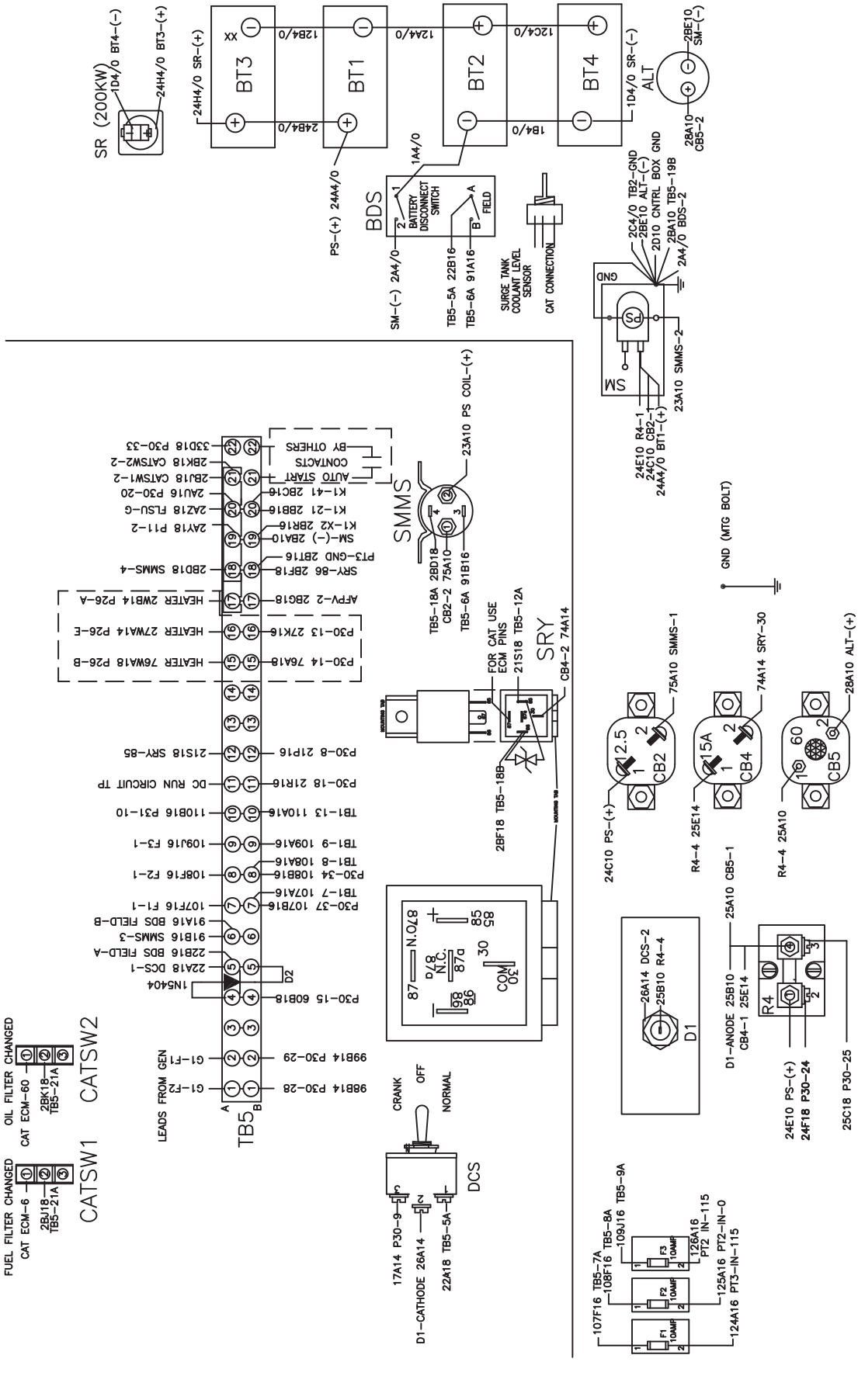
CONTROL BOX WIRING DIAGRAM



CONTROL BOX HINGED CONTROL PANEL

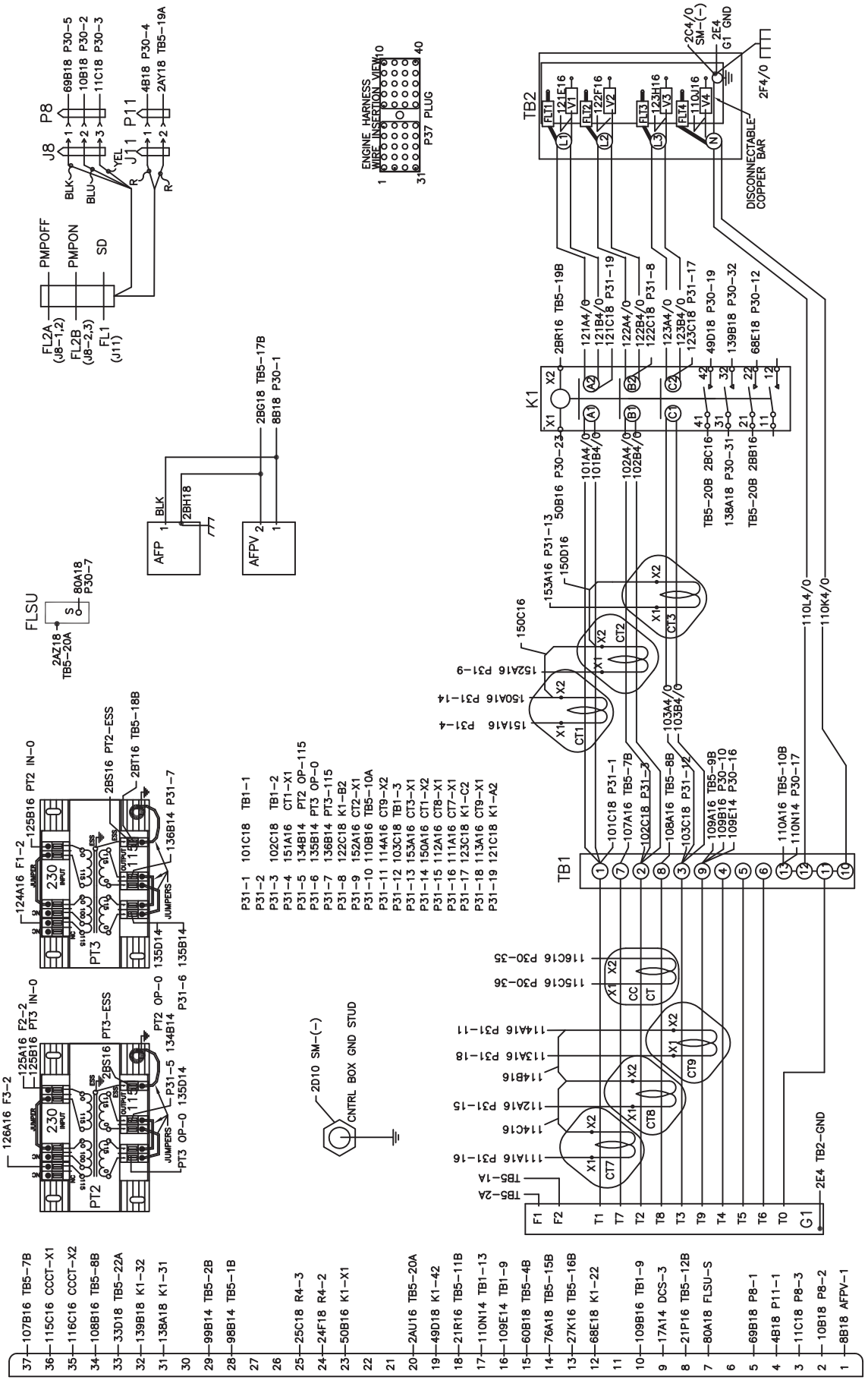
PN: 0116-2912-08 REV G

200 KW ENGINE WIRING DIAGRAM



PN: 0116-2912-09 REV G

200 KW ENGINE WIRING DIAGRAM



UNIT (FIELD) LEVEL MAINTENANCE
TACTICAL QUIET GENERATOR 200 kW, 50/60 Hz MEP-809A/PU-809A
REPROGRAMMING

INITIAL SETUP:

Tools and Special Tools
None

References
WP 0083

Materials/Parts
None

Equipment Condition
TQG is not operating and powered down

Personnel Required
One

REPROGRAMMING DVR PARAMETERS FOR VOLTAGE AND FREQUENCY CHANGE

The following procedure is used if the voltage and frequency settings for the generator set must be changed because of mission requirements. When that occurs, the reconnection board must be repositioned and the DVR must be reprogrammed for specified frequency and voltage. Note that the GSC OP-5 parameters must be reprogrammed, also.

1. Set Battery Disconnect Switch to ON.
2. Set DEAD CRANK SWITCH to NORMAL.
3. On EMCP, set ENGINE CONTROL Switch (ECS) to COOL DOWN/STOP.
4. Select reprogramming data from Table 1 below according to the desired output voltage and desired frequency. Mission requirements will define requirements. Note: All 6 of the DVR PARAMETERS must be changed or verified.

Table 1. 200 kW TQG DVR Voltage and Frequency Programming Parameters and Setpoints.

DESIRED OUTPUT		DVR PARAMETER NUMBER					
VOLTS	HERTZ	:01	:02	:03	:04	:05	:06
120/208	60	217	1.0	0	694	4.34	58.8
120/208	50	205	1.0	0	578	3.61	49.8
240/416	60	434	2.0	0	347	4.34	58.8
240/416	50	410	2.0	0	289	3.61	49.8

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5. Press the up arrow key ▲.DVR display should read :01 (the colon with the number indicates that the number is a parameter number).

6. Press and hold up arrow key ▲ until display shows parameter number :90. Parameter number: 90 is a password that can be used to protect the settings.

7. Press Function ◄► key on DVR once to display data for parameter :90.

8. Press and hold up arrow key ▲ or down arrow key ▼ to set the data for parameter number :90 to 0200.

9. Press Function ◄► key on DVR once to display parameter :90.

10. Press and hold up arrow key ▲ or down arrow key ▼ to change to parameter number :01

11. Press Function ◄► key on DVR once to display data for parameter .

12. Press and hold up arrow key ▲ or down arrow key ▼to set the data for parameter per Table 1.

13. Press Function ◄► key on DVR once to switch back to the parameter number.

14. Press up arrow key ▲ once to change to next parameter number per Table 1.

15. Keep repeating from step 9, entering parameter data from Table 1, until all 6 parameter data is entered or verified to be correct.

16. Press Function ◄► key on DVR once to display data for parameter :90.

17. Press and hold up arrow key ▲ or down arrow key ▼ to set the data for parameter number :90 to any number but **0009 to lock the DVR. DVR will not stay locked when Engine Control switch is switched from either COOL DOWN/STOP** to OFF/RESET and back to COOL DOWN/STOP or from COOL DOWN/STOP to MANUAL START.

18. Press Function ◄► key on DVR once to switch back to parameter number. Press and hold up arrow key ▲ or down arrow key ▼ to set the parameter number back to 01.

19. Proceed to REPROGRAMMING GSC SETPOINTS FOR VOLTAGE AND FREQUENCY CHANGE and reprogram the OP5 parameters for P028 thru P031 (steps 1 thru 25).

20. If the generator set is not to be used, set ENGINE CONTROL Switch (ECS) to OFF/RESET, set DEAD CRANK SWITCH to OFF, and set Battery Disconnect Switch to OFF.

END OF TASK

PN: 0116-2912-10 REV K

REPROGRAMMING GSC PARAMETERS FOR VOLTAGE AND FREQUENCY CHANGE

1. Set Battery Disconnect Switch to ON.
2. Set DEAD CRANK SWITCH to NORMAL.
3. On EMCP, set ENGINE CONTROL Switch (ECS) to COOL DOWN/STOP.
4. Select programming data from GSC from Table 3 for desired output voltage and desired frequency.

Table 3. 200 kW TQG GSC Programming Setpoints.

DESIRED OUTPUT		OP5-0				OP5-1			
VOLTS	HERTZ	P028	P029	P030	P031	P114	P117	P120	P123
120/208	60	208	694	200	60	63	66	57	54
120/208	50	208	576	166	50	53	55	48	45
240/416	60	416	347	200	60	63	66	57	54
240/416	50	416	288	166	50	53	55	48	45

NOTE

In SERVICE MODE, the buttons on the GSC keypad perform new functions as follows:

POWER METER is Scroll Right
AC METER is Scroll Up
ENGINE METER is Scroll Down
LAMP TEST is Select
ALARM CODES is Enter

5. Press SERVICE MODE key on GSC. SERV will be displayed on upper display. OP1 will be displayed on lower display.
6. Press AC METER key five times. OP3 will be displayed.
7. Press the LAMP TEST key. P E ----- will be displayed. The left-most underline will be flashing. If an error is made any time during the password entry, P E FAIL will be displayed. Password entry can be restarted by pressing LAMP TEST key.
8. Press POWER METER key. P E 1---- will be displayed. The left-most underline will be flashing.
9. Press ENGINE METER key. P E 1 3--- will be displayed. The left-most underline will be flashing.
10. Press AC METER key. P E 1 3 2-- will be displayed. The left-most underline will be flashing.
11. Press AC ENGINE key. P E 1 3 2 3- will be displayed. The underline will be flashing.
12. Press POWER METER key. P E 1 3 2 3 1 will be displayed.
13. Press ALARM CODES key. P E PASS will be displayed.
14. Press EXIT key. OP4 will be displayed.
15. Press AC METER key. OP5 will be displayed.

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NOTE

For input values the OP set and parameter values will toggle between the upper and lower displays as each OP set is entered.

16. Press AC METER key or ENGINE METER key until OP5-0 is displayed.
17. Press LAMP TEST key. P001 will be displayed followed by the value of the set point.
18. Press ENGINE METER key until P028 is displayed (P028 is first setpoint in table).
19. Press LAMP TEST key. The value of the setpoint will begin to flash.
20. Press AC MRETER key or ENGINE METER key to change the value, as required, to what is shown in Table 3 corresponding to the desired voltage and frequency.
21. Press ALARM CODES key. The value of the setpoint will stop flashing.
22. Repeat steps 18 through 21 until all setpoint values are checked or changed for OP5-0.
23. Repeat steps 16 through 22 for OP5-1. The first set point displayed will be P101. The first setpoint to be changed/verified is P114, per Table 3.
24. At the completion of the programming, press EXIT key until SERV is no longer displayed on upper display.
25. If the generator set is not to be used, set ENGINE CONTROL Switch (ECS) to OFF/RESET, set DEAD CRANK SWITCH to OFF, and set Battery Disconnect Switch to OFF.

END OF TASK

PN: 0116-2912-11 REV G

100/200 KW ENGINE HARNESS SCHEMATIC LEGEND

REFERENCE DESIGNATION	DESCRIPTION
ENG–P101	PLUG, AIR INLET HEATER RELAY CONNECTOR, ENGINE HARNESS ENGINE HARNESS, 100 KW
ENG–P11	PLUG, ATMOSPHERE PRESSURE SENSOR CONNECTOR, ENGINE HARNESS, 100 KW
ENG–P12	PLUG, TURBO OUTLET PRESSURE SENSOR CONNECTOR, ENGINE HARNESS, 100 KW
ENG–P13	PLUG, INJECTOR ACTUATOR PRESSURE SENSOR CONNECTOR, ENGINE HARNESS, 100 KW
ENG–P17	PLUG, FUEL PRESSURE SENSOR CONNECTOR, ENGINE HARNESS, 100 KW
ENG–P15	PLUG, OIL PRESSURE SENSOR CONNECTOR, ENGINE HARNESS, 100 KW
ENG–P10	PLUG, CONNECTOR FOR TDC PRONE, TIMING CALIBRATION, ENGINE HARNESS, 100 KW
ENG–P6	PLUG, COOLANT TEMP SENSOR CONNECTOR, ENGINE HARNESS, 100 KW
ENG–P7	PLUG, INTAKE MANIFOLD AIR TEMP SENSOR CONNECTOR, ENGINE HARNESS, 100 KW
ENG–P18	PLUG, OIL TEMP SENSOR CONNECTOR, ENGINE HARNESS, 100 KW
ENG–P4	PLUG, TOP CRANKSHAFT TIMING SENSOR CONNECTOR, ENGINE HARNESS, 100 KW
ENG–P5	PLUG , BOTTOM CRANKSHAFT TIMING SENSOR CONNECTOR, ENGINE HARNESS, 100 KW
ENG–P3	PLUG, IAP CONTROL VALVE CONNECTOR, ENGINE HARNESS, 100 KW
ENG–P300	PLUG, FUEL INJECTION HARNESS CONNECTOR, ENGINE HARNESS, 100 KW
ENG–P2	PLUG, ECM CONNECTOR, ENGINE HARNESS 100/200 KW
ENG–P1	PLUG, EMCP HARNESS CONNECTOR, ENGINE HARNESS 100/200 KW
CDC–P7	PLUG, CAT DIAGNOSTIC COMPUTER CONNECTOR, CONNECTOR, ENGINE HARNESS 100/200 KW
ENG–P16	PLUG, LOW COOLANT SENSOR CONNECTOR, ENGINE HARNESS 100/200 KW
ENG–P14	PLUG, MAGNETIC SPEED PICKUP (MPU) CONNECTOR, ENGINE HARNESS 100/200 KW
ENG–P8	PLUG, TURBO INLET PRESSURE SENSOR CONNECTOR, ENGINE HARNESS 100/200 KW

PN: 0116–2912–12 REV G

100/200 KW ENGINE HARNESS SCHEMATIC LEGEND

REFERENCE DESIGNATION	DESCRIPTION
ENG–P301	PLUG, UNIT INJECTOR NO. 1 CONNECTOR, ENGINE HARNESS, 100 KW
ENG–P302	PLUG, UNIT INJECTOR NO. 2 CONNECTOR, ENGINE HARNESS, 100 KW
ENG–P303	PLUG, UNIT INJECTOR NO. 3 CONNECTOR, ENGINE HARNESS, 100 KW
ENG–P304	PLUG, UNIT INJECTOR NO. 4 CONNECTOR, ENGINE HARNESS, 100 KW
ENG–P305	PLUG, UNIT INJECTOR NO. 5 CONNECTOR, ENGINE HARNESS, 100 KW
ENG–P306	PLUG, UNIT INJECTOR NO. 6 CONNECTOR, ENGINE HARNESS, 100 KW
ENG–P20	PLUG, FILTERED FUEL PRESSURE SENSOR CONNECTOR, ENGINE HARNESS, 200 KW
ENG–0213	PLUG, ETHER INJECTION RELAY CONNECTOR, ENGINE HARNESS, 200 KW
ENG–P203	PLUG, ATMOSPHERIC PRESSURE SENSOR CONNECTOR, ENGINE HARNESS, 200 KW
ENG–P200	PLUG, TURBO OUTLET PRESSURE SENSOR CONNECTOR, ENGINE HARNESS, 200 KW
ENG–P202	PLUG, FUEL PRESSURE SENSOR CONNECTOR, ENGINE HARNESS, 200 KW
ENG–P201	PLUG, OIL PRESSURE SENSOR CONNECTOR, ENGINE HARNESS, 200 KW
ENG–P400	PLUG, TDC PROBE CONNECTOR, ENGINE HARNESS, 200 KW
ENG–P105	PLUG, FUEL TEMP SENSOR CONNECTOR, ENGINE HARNESS, 200 KW
ENG–P100	PLUG, COOLANT TEMP SENSOR CONNECTOR, ENGINE HARNESS, 200 KW
ENG–P103	PLUG, INTAKE MANIFOLD AIR TEMP SENSOR CONNECTOR, ENGINE HARNESS, 200 KW
ENG–P401	PLUG, CRANK SHAFT SPEED/TIMING SENSOR CONNECTOR, ENGINE HARNESS, 200 KW
ENG–P402	PLUG, CAM SHAFT SPEED/TIMING SENSOR CONNECTOR, ENGINE HARNESS, 200 KW

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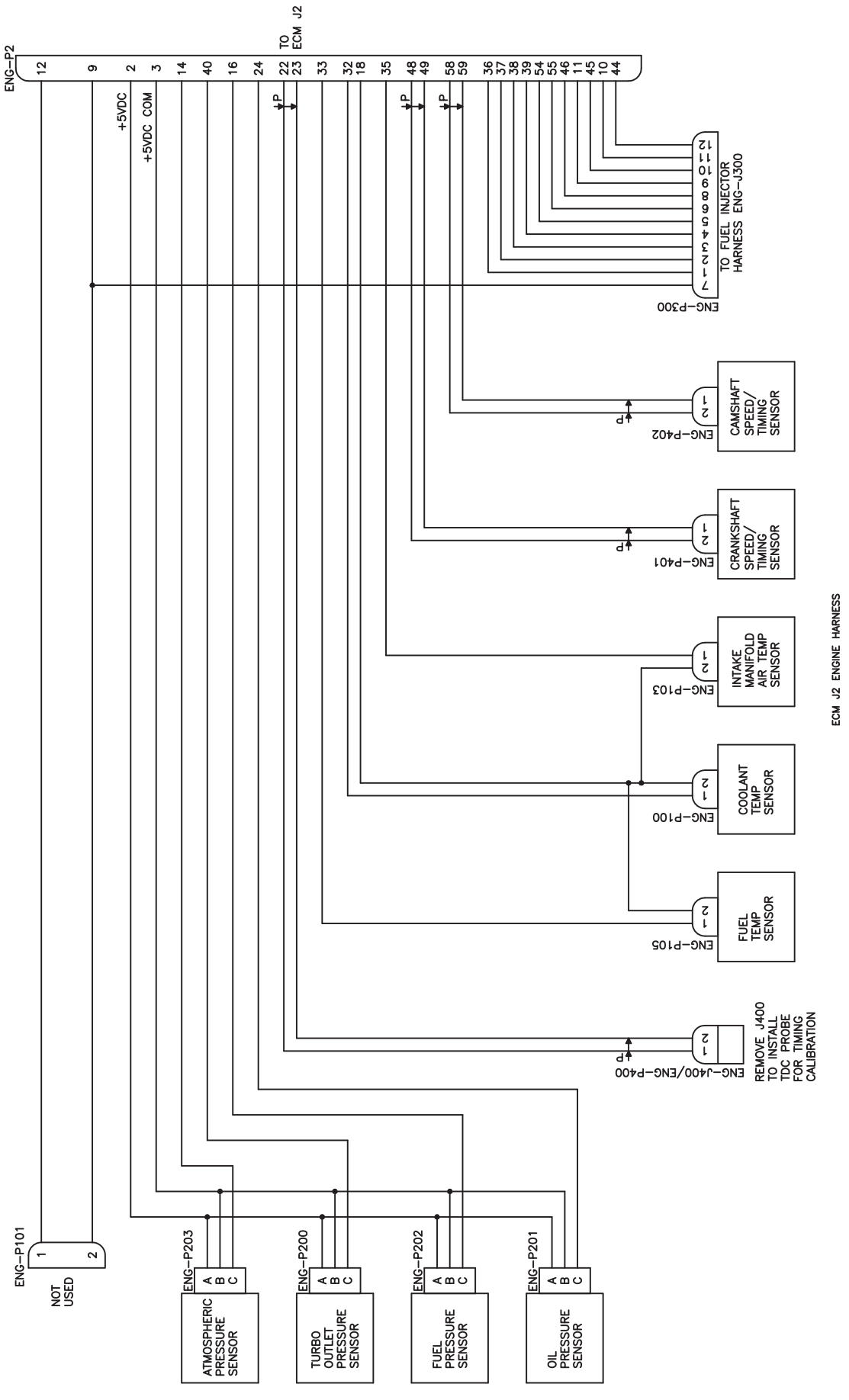
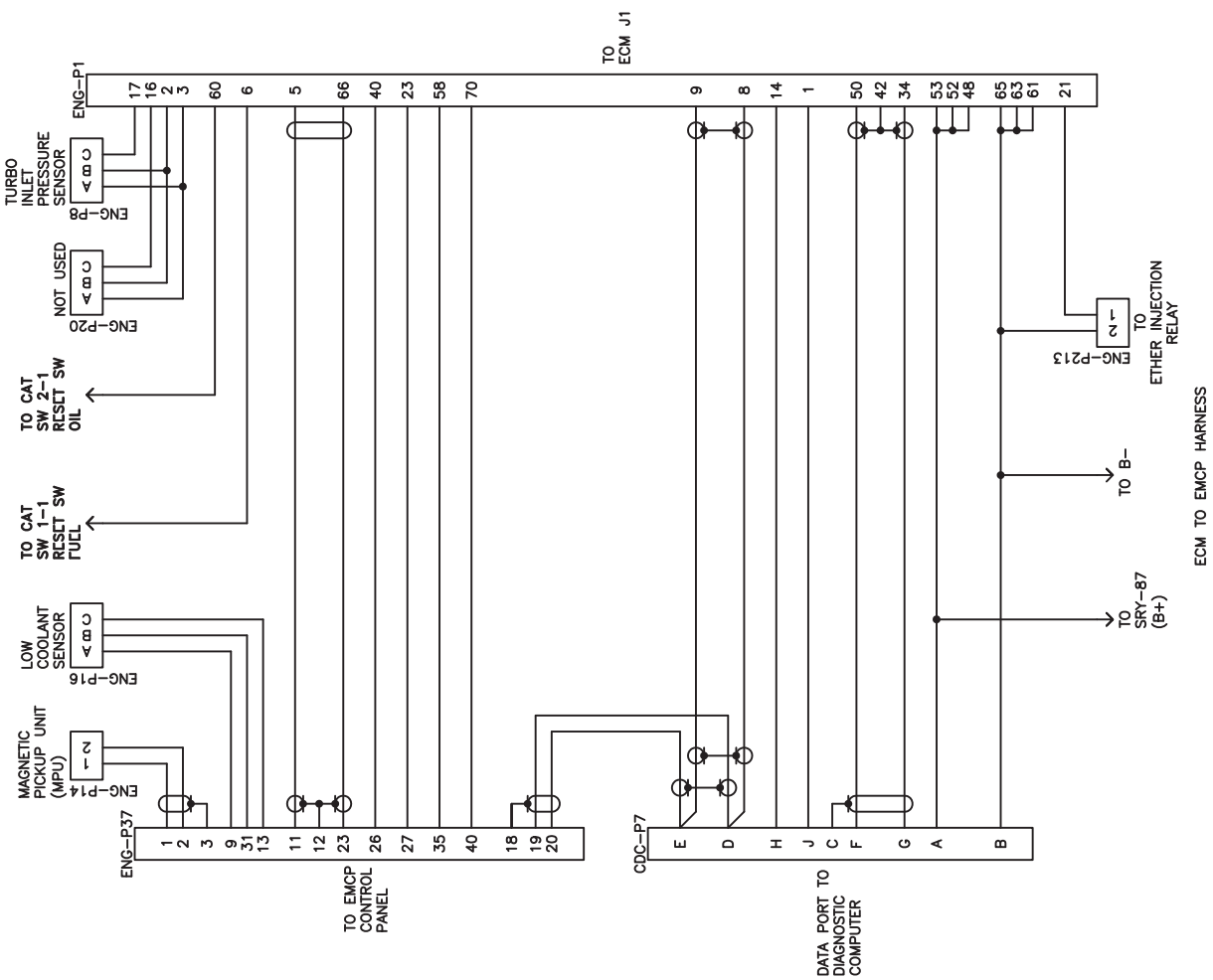
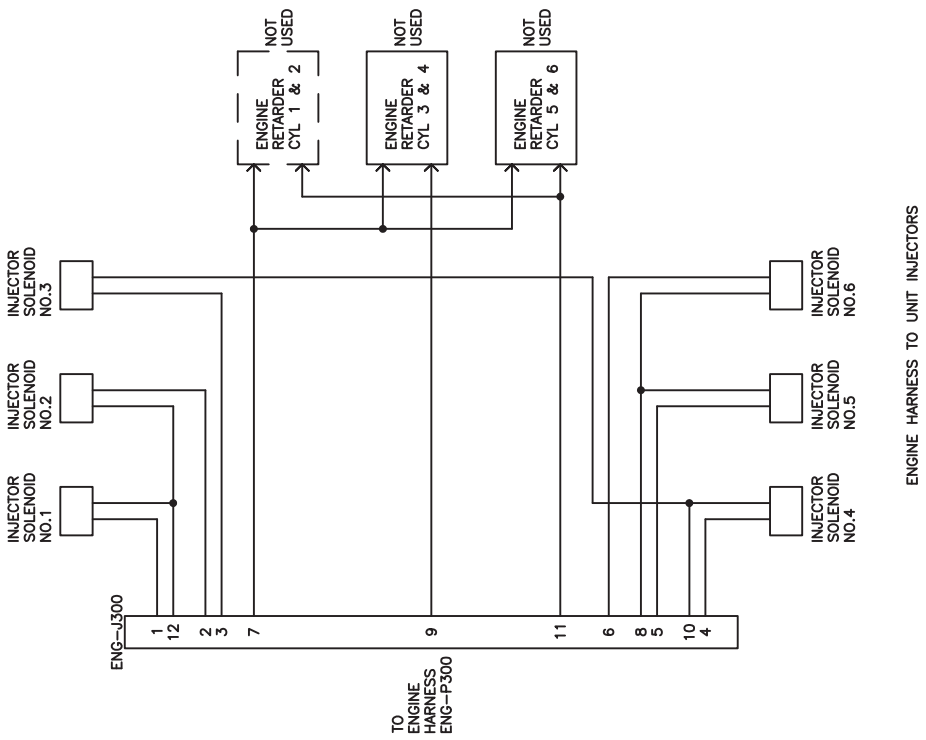
200kW ENGINE HARNESSES- SCHEMATIC DIAGRAM



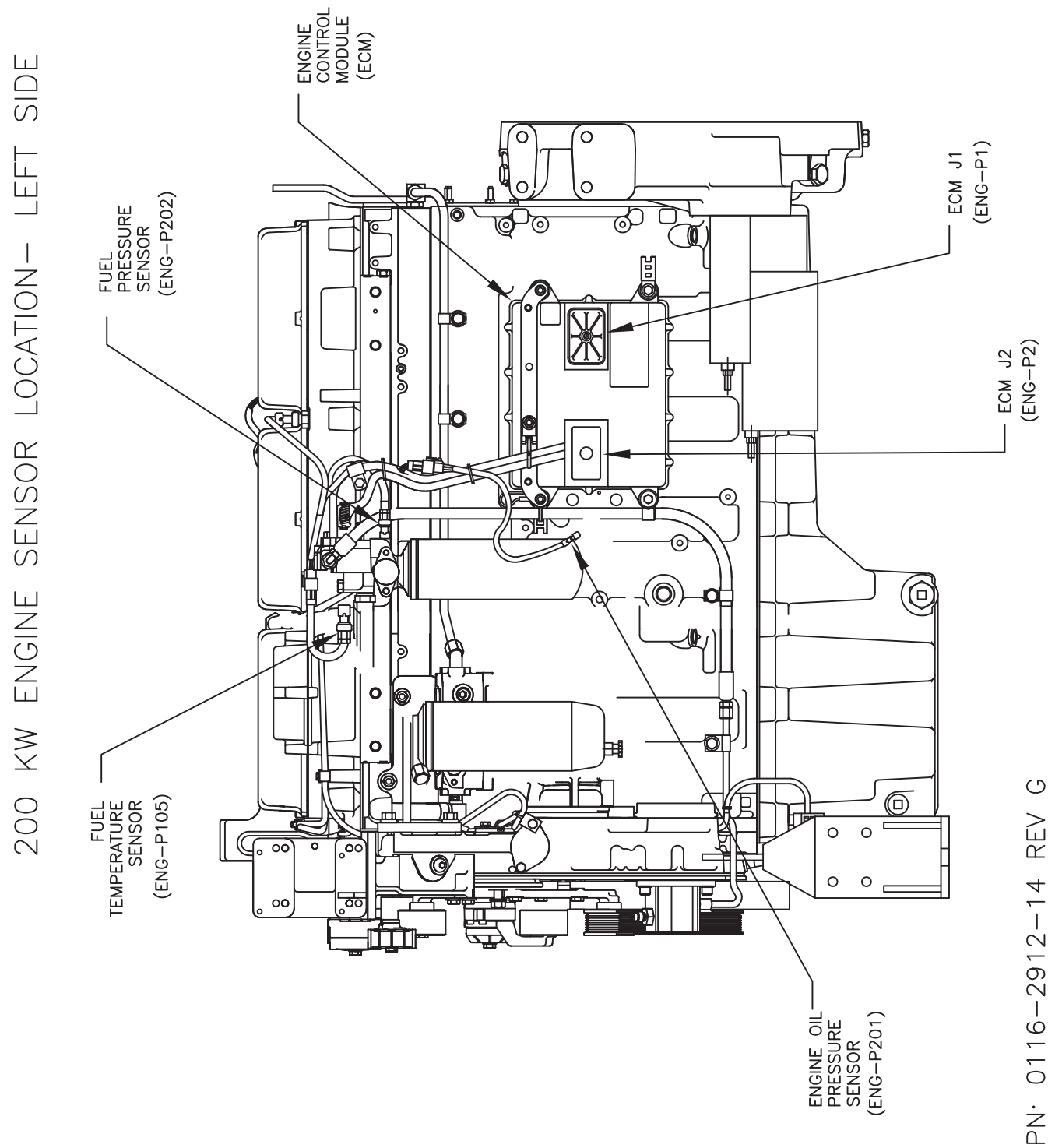
PN: 0116-2912-13 REV G

200kW ENGINE HARNESSES- SCHEMATIC DIAGRAM

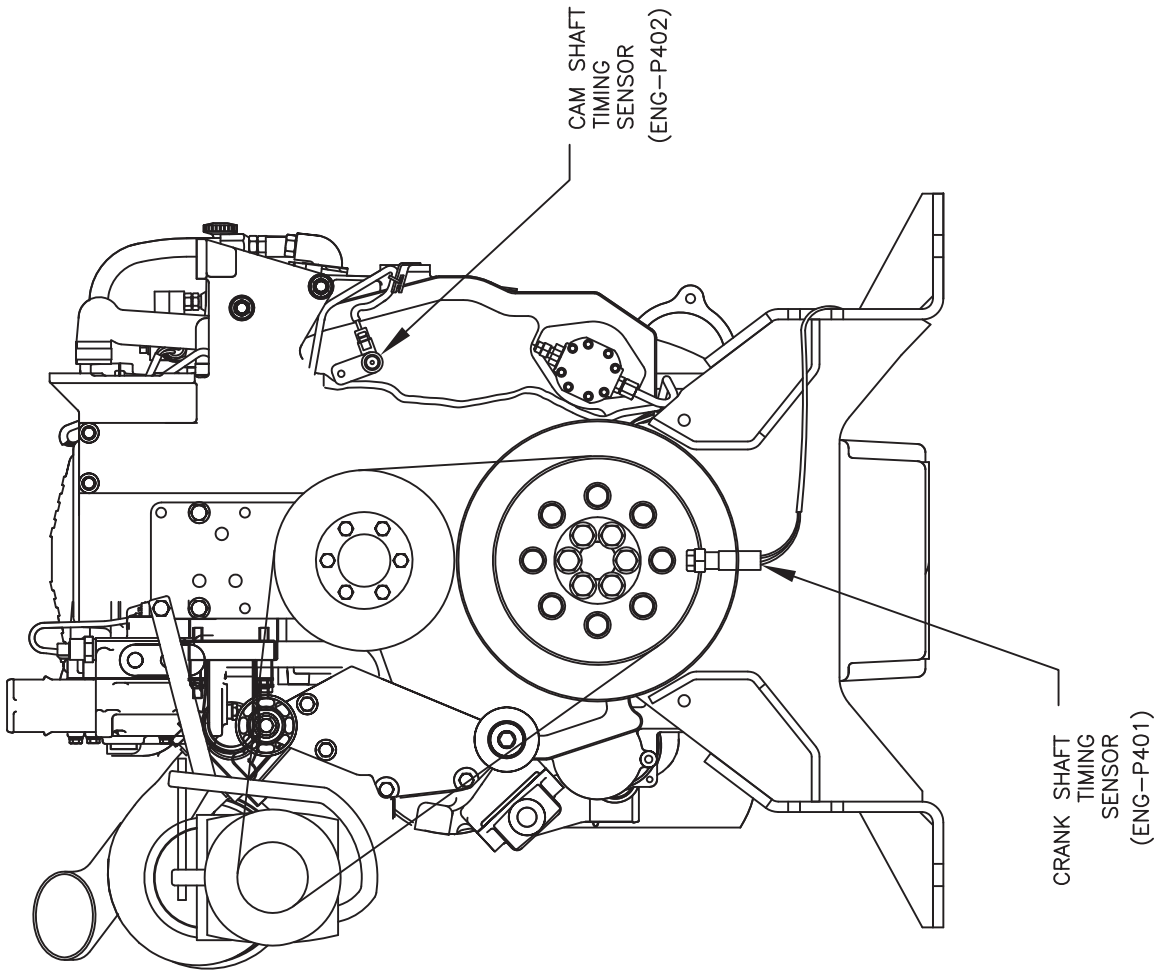




PN: 0116-2912-13 REV G

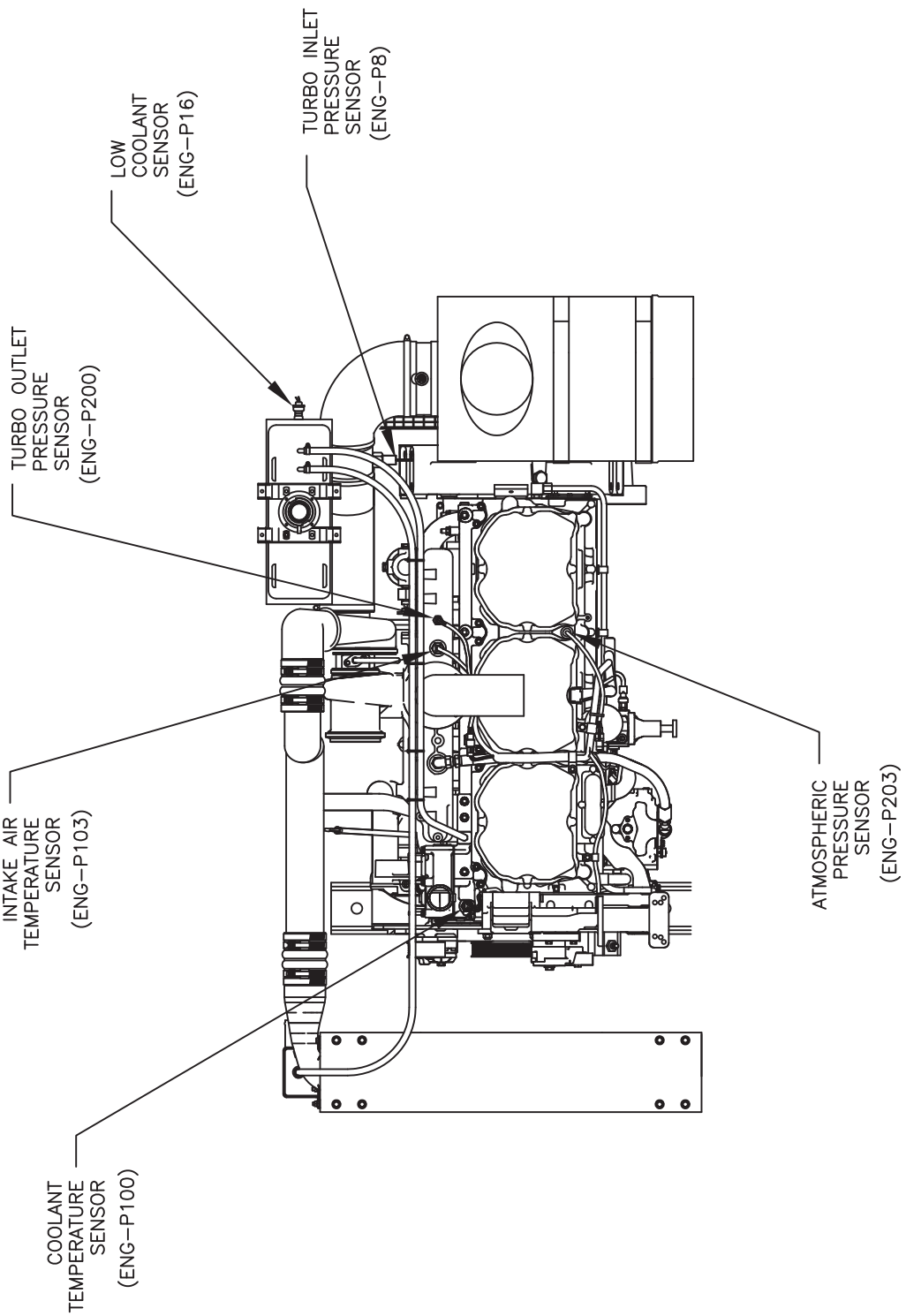

200 KW ENGINE SENSOR LOCATION– LEFT SIDE
ENGINE CONTROL MODULE (ECM)
FUEL PRESSURE SENSOR (ENG–P202)
ECM J1 (ENG–P1)
ECM J2 (ENG–P2)
FUEL TEMPERATURE SENSOR (ENG–P105)
ENGINE OIL PRESSURE SENSOR (ENG–P201)
PN· 0116–2912–14 REV G

200 KW ENGINE SENSOR LOCATION– FRONT



PN: 0116–2912–14 REV G

200 KW ENGINE SENSOR LOCATION– TOP


TURBO INLET PRESSURE SENSOR (ENG–P8)
LOW COOLANT SENSOR (ENG–P16)
TURBO OUTLET PRESSURE SENSOR (ENG–P200)
INTAKE AIR TEMPERATURE SENSOR (ENG–P103)
COOLANT TEMPERATURE SENSOR (ENG–P100)
ATMOSPHERIC PRESSURE SENSOR (ENG–P203)

PN: 0116–2912–15 REV G

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PN: 0116-2912-15 REV G

GLOSSARY

TERM	DEFINITION
Bus	The common power conducting wires or bars to which all power sources within the power system are connected through their individual circuit breakers.
Dead Bus	A bus from which all the available power sources are disconnected.
De-energize	To remove voltage from a circuit or device in order to deactivate it.
Droop	Paralleling mode that allows slight fluctuations in frequency so that lagging generator set can match frequency of companion generator.
EMI	Electromagnetic interference is any electromagnetic disturbance that interrupts, obstructs or other wise degrades or limits the effective performance of electronics and electrical equipment as a result of spurious emissions and responses.
Energize	To apply voltage to a circuit or device in order to activate it.
Excitation voltage	DC voltage applied from the voltage regulator to the generator exciter field windings.
Generator overload condition	Load greater than the load for which the system or mechanism was intended. For TQGs, overload is defined as the condition when current in all three phases exceeds 100% of rated current or when current in a single phase exceeds 130% of rated current.
Ground fault circuit interrupter (GFCI)	A device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a current to ground exceeds some predetermined value that is less than that required to operate the overcurrent protection device of the supply circuit. The TQG convenience receptacle is protected by a GFCI.
Incoming generator	The generator that is being connected to the bus.
Isochronous	Paralleling mode that requires precise matching of frequency for companion generators.
kV	Kilovolt. One kilovolt equals 1000 volts.
KVAR	Kilovolt amperes reactive. Measure of reactive power.
KVARhr	Kilovolt amperes reactive hours. Measure of reactive power over time.
kW	Kilowatt. One kilowatt equals 1000 watts. Measure of real power.
Load bus	Common power conducting wires or bars to which all generator set loads are connected through their individual circuit breakers.
Overcurrent condition	Any current in excess of the rated current of equipment. The condition may result from overload, short circuit, or ground fault.
Paralleling	The procedure for synchronizing and connecting two or more generator sets to a common load bus.

GLOSSARY - Continued

TERM	DEFINITION
Reverse power	Power flows from one generator set into another generator set when operating in parallel. For the TQGs, reverse shutdown power occurs when reverse power exceeds 17% of rated value.
TQG control circuit	Primarily consists of 24 Vdc circuitry, meters and controls for generator set starting, stopping, monitory, and fault annunciation.
Wet stacking	Buildup of unburned diesel fuel and carbon residues in the engine and exhaust system of diesel engines. Wet stacking can cause an oily, tar-like residue to exit from the exhaust pipe.

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RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS

For use of this form, see AR 25–30; the proponent agency is ODISC4.

Use Part II (*reverse)* for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/ Supply Manuals (SC/SM)

DATE: 8/30/02

TO: (*Forward to proponent of publication or form)(Include ZIP Code)*
Commander, U.S. Army C-E LCMC
ATTN: AMSEL-LC-LEO-E-ED-P
FORT MONMOUTH, NJ 07703-5000

FROM: (*Activity and location)(Include ZIP Code)*
Jane Q. Doe, SFC
1234 Any Street
Nowhere Town, AL 34565

PART 1 – ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER	DATE	TITLE
TM 11-4940-355-12	16 Sep 2002	Organizational, Direct Support, And General Support Maintenance Manual for Machine Gun, .50 Caliber M3P and M3P Machine Gun Electrical Test Set Used On Avenger Air Defense Weapon System

ITEM NO.	PAGE NO.	PARA–GRAPH	LINE NO. *	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON
1	WP0005 PG 3		2			Test or Corrective Action column should identify a different WP number.

EXAMPLE

** Reference to line numbers within the paragraph or subparagraph.*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/ AUTOVON, PLUS EXTENSION	SIGNATURE
Jane Q. Doe, SFC	788–1234	

DA FORM 2028, FEB 74 REPLACES DA FORM 2028, 1 DEC 68, WHICH WILL BE USED. USAPA V3.01

TO: (*Forward direct to addressee listed in publication*)	**FROM:** (*Activity and location) (Include ZIP Code)*	**DATE**
Commander, U.S. Army C-E LCMC ATTN: AMSEL-LC-LEO-E-ED-P FORT MONMOUTH, NJ 07703-5000	Jane Q. Doe, SFC 1234 Any Street Nowhere Town, AL 34565	8/30/02

PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION NUMBER	DATE	TITLE

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III – REMARKS (*Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

EXAMPLE

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
Jane Q. Doe, SFC	788–1234	

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS **For use of this form, see AR 310-1; the proponent agency is the US Army Adjutant General Center.**	Use Part II *(reverse)* for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
TO: *(Forward to proponent of publication or form) (Include ZIP Code)*	**FROM:** *(Activity and location) (Include ZIP Code)*	

PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER	DATE	TITLE

ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON *(Exact wording of recommended change must be given)*

** Reference to line numbers within the paragraph or subparagraph.*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE

DA FORM 1 FEB 74 **2028**

REPLACES DA FORM 2028, 1 DEC 68, WHICH WILL BE USED.

TO: *(Forward to proponent of publication or form) (Include ZIP Code)*	**FROM:** *(Activity and location) (Include ZIP Code)*	**DATE**

PART II- REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION/FORM NUMBER	DATE	TITLE

PAGE NO.	COLM NO.	LINE NO.	FEDERAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPROTED	RECOMMENDED ACTION

PART III - REMARKS ***(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)***

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PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER	DATE	TITLE

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DA FORM 1 FEB 74 **2028**

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PART II- REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION/FORM NUMBER	DATE	TITLE

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TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE

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By Order of the Secretary of the Army:

PETER J. SCHOOMAKER
General, United States Army
Chief of Staff

Official:

JOYCE E. MORROW
Administrative Assistant to the
Secretary of the Army
0627801

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SCHEMATIC AND WIRING DIAGRAM LEGEND

REFERENCE DESIGNATION	ITEM DESCRIPTION
A1	GENERATOR SET CONTROL (GSC)
A2	ALARM MODULE
A3	DIGITAL VOLTAGE REGULATOR (DVR)
A4	LOAD SHARING MODULE (LSM)
A5	AC TRANSFORMER BOX (ATB)
A6	BUSS TRANSFORMER BOX (BTB)
A7	RESISTOR ASSY
A8	ENGINE CONTROL MODULE (ECM)
AFP	AUXILIARY FUEL PUMP
AFPR	AUXILIARY FUEL PUMP RELAY
AFPS	AUXILIARY FUEL PUMP SWITCH
AFPV	AUXILIARY FUEL PUMP SOLENOID VALVE
ALM	ALARM
ALT	ALTERNATOR
AR	ALARM RESET
AS	ALARM SILENCE SWITCH
ATB	AC TRANSFORMER BOX
BDS	BATTERY DISCONNECT SWITCH
BSS	BATTLE SHORT SWITCH
BTB	BUS TRANSFORMER BOX
CATSW1	FUEL FILTER RESET
CATSW2	OIL FILTER RESET
CB1	DC POWER CIRCUIT BREAKER
CB2	STARTER SOLENOID CIRCUIT BREAKER
CB3	CIRCUIT BREAKER AND GFCI PROTECTION FOR CONVENIENCE RECEPTACLE
CB4	ECM POWER CIRCUIT BREAKER
CB5	ALTERNATOR CIRCUIT BREAKER
CCCT	CROSS CURRENT COMPENSATION (OR DROOP) TRANSFORMER
CCL	CONTACTOR CLOSED LIGHT
CCS	CONTACTOR CONTROL SWITCH
CDR	COOL DOWN RELAY
CT1, CT2, CT3	CURRENT TRANSFORMERS, LOAD OUTPUT
CT7, CT8, CT9	CURRENT TRANSFORMER, LOAD SHARING
CTR	CRANK TERMINATION RELAY
D1	DIODE MAIN POWER
D2	DIODE DEAD CRANK BLOCKING
D3	DIODE FIELD FLASH BLOCKING
D4	DIODE BREAKER CLOSURE BLOCKING
DBHI	DEAD BUS RELAY HIGH VOLTAGE SENSING
DBLO	DEAD BUS RELAY LOW VOLTAGE SENSING
DCA	DC AMMETER
DCS	DEAD CRANK SWITCH
ECS	ENGINE CONTROL SWITCH (MASTER)
EGR	ELECTRONIC GOVERNOR RELAY
ESPB	EMERGENCY STOP PUSH BUTTON
F1, F2, F3	FUSE, POTENTIAL TRANSFORMERS
FCR	FUEL CONTROL RELAY
FL1	LOW LEVEL FUEL ALARM SWITCH
FL2A	AUX FUEL PUMP OFF SWITCH
FL2B	AUX FUEL PUMP ON SWITCH
FLG	FUEL LEVEL GAUGE
FLSU	FUEL LEVEL SENDING UNIT
FLT1, FLT2, FLT3, FLT4	FILTER, EMI
G1	GENERATOR
GFCI	GROUND FAULT CIRCUIT INTERRUPTER, CONVIENCE RECEPTACLE
GFR	GENERATOR FAULT RELAY
GND	GROUND
HTR1, HTR2	HEATER RESISTOR WINTERIZATION
IDS	ISOCHRONOUS DROOP SWITCH

REFERENCE DESIGNATION	ITEM DESCRIPTION
J7	A1 CONNECTOR
J8	FUEL SWITCH PUMP CONTROL
J11	FUEL SWITCH LOW LEVEL SHUTDOWN
J30	CONNECTOR, CONTROL BOX 37 PIN
J31	CONNECTOR, CONTROL BOX 19 PIN
J32, J33	CONNECTOR, PARALLELING
J37	CONNECTOR, CONTROL BOX
J101	CONVENIENCE RECEPTACLE
K1	MAIN LOAD CONTACTOR
KAFP	RELAY AUXILIARY FUEL PUMP
KFF	RELAY FIELD FLASH
KR	MAIN CONTACTOR RELAY
L1, L2, L3	LOAD LEADS
LCL	LOW COOLANT LEVEL SENSOR
LFL	LOW FUEL LEVEL
LSM	LOAD SHARING MODULE
LT	LAMP TEST SWITCH
MAN	MANUAL
MPU	MAGNETIC SPEED PICKUP
N	NEUTRAL
NEU	NEUTRAL
OL/SC	OVERLOAD / SHORT CIRCUIT MODULE
P7	A1 CONNECTOR
P8	FUEL SWITCH PUMP CONTROL
P11	FUEL SWITCH LOW LEVEL SHUTDOWN
P30	CONTROL BOX 37 PIN
P31	CONTROL BOX 19 PIN
P32	PARALLEL CABLE PLUGS
P37	CONTROL BOX /A1 CONNECTOR
PL1, PL2, PL3	PANEL ILLUMINATION LIGHT
PLS	PANEL LIGHT SWITCH
PS	PINION SOLENOID (STARTER SOLENOID)
PSR	PROGRAMMABLE SPARE RELAY
PSU	PARALLEL / SINGLE UNIT SWITCH
PT2, PT3	POTENTIAL TRANSFORMERS FOR POWER INPUT TO A3 (DVR)
R1	RESISTOR FIELD FLASH
R2	RESISTOR VOLTAGE DROOP
R3	RESISTOR DEAD BUS
R4	DC AMMETER SHUNT
RM	RELAY MODULE
RR	RUN RELAY
SM	STARTER MOTOR
SMMS	STARTER MOTOR MAGNETIC SWITCH
SMR	STARTER MOTOR RELAY
SMS	SYNCHRONIZING MODE SELECTOR SWITCH
SR	SLAVE RECEPTACLE
SRY	SLAVE RELAY
SSP	SPEED SETTING POTENTIOMETER
T1-T10	GENERATOR LINE LEADS
TB1	GENERATOR RECONNECTION BOARD
TB2	LOAD CONNECTION BOARD
TB5	TERMINAL STRIP (ENGINE GENERATOR)
V1, V2, V3, V4	VARISTOR
VAR	VOLTAGE ADJUST RHEOSTAT

NOTES:

1. DC VOLTAGES SHOWN ARE NOMINAL VALUES, VOLTAGES MAY VARY BETWEEN 20-32VDC UNLESS OTHERWISE SPECIFIED.
2. AC VOLTAGES SHOWN ARE NOMINAL VALUES. VOLTAGE MAY VARY ±10%.
3. GSC A1 RELAY MODULE PIN NUMBERS ARE PREFIXED BY RM.
4. J37 CONNECTS TO THE ENGINE CONTROL PANEL INTERFACE HARNESS.
5. ⟨*⟩ NUMBER REFERS TO INTERCONNECTION BEARING SAME NUMBER.

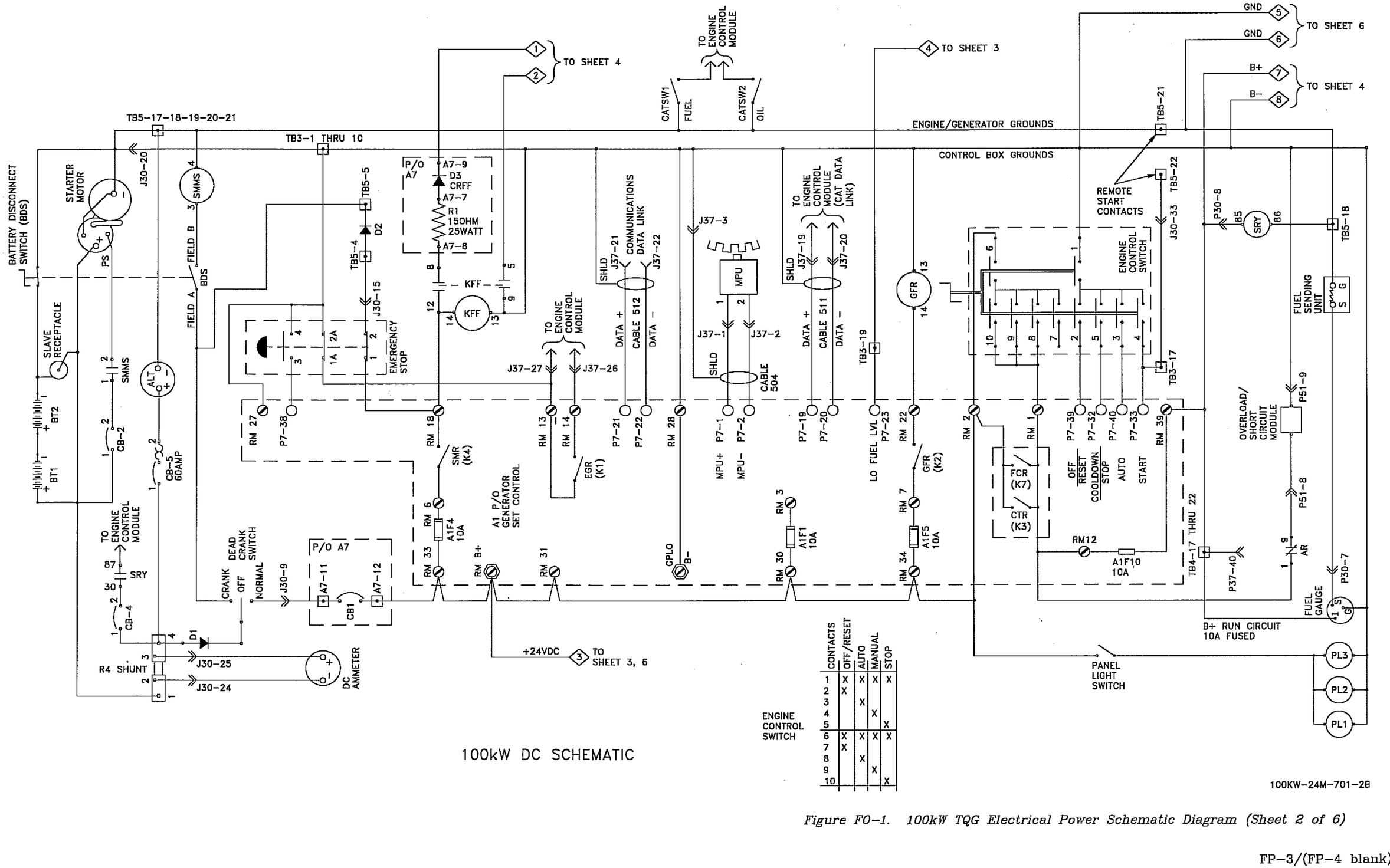
SYMBOL LEGEND

⊘ RELAY MODULE TERMINAL

○ GSC CONNECTOR CONTACT

200KW-24M-701-1D

Figure FO-1. 200kW TQG Electrical Power Schematic Diagram (Sheet 1 of 6)



100kW DC SCHEMATIC

Figure FO-1. 100kW TQG Electrical Power Schematic Diagram (Sheet 2 of 6)

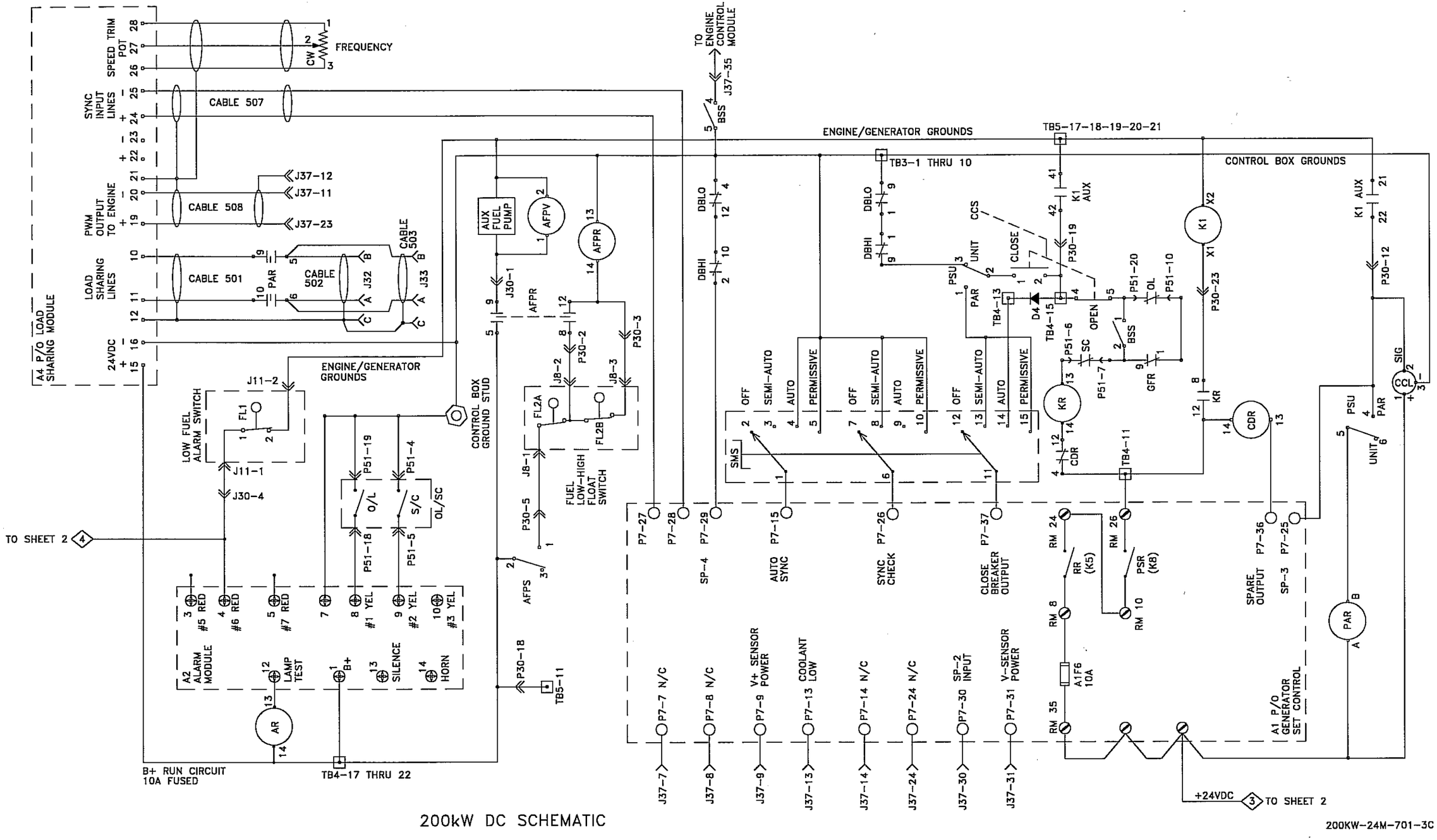
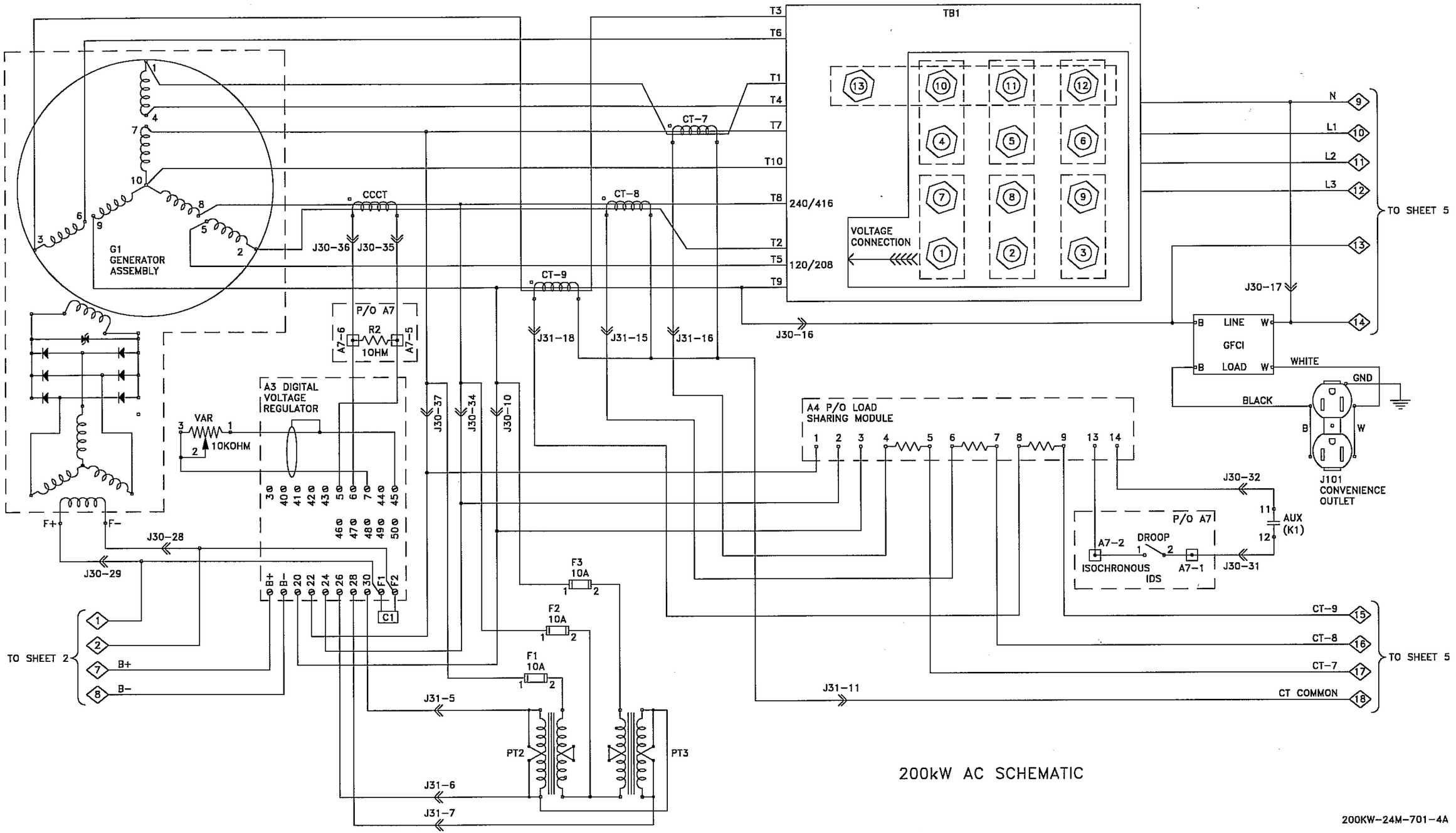


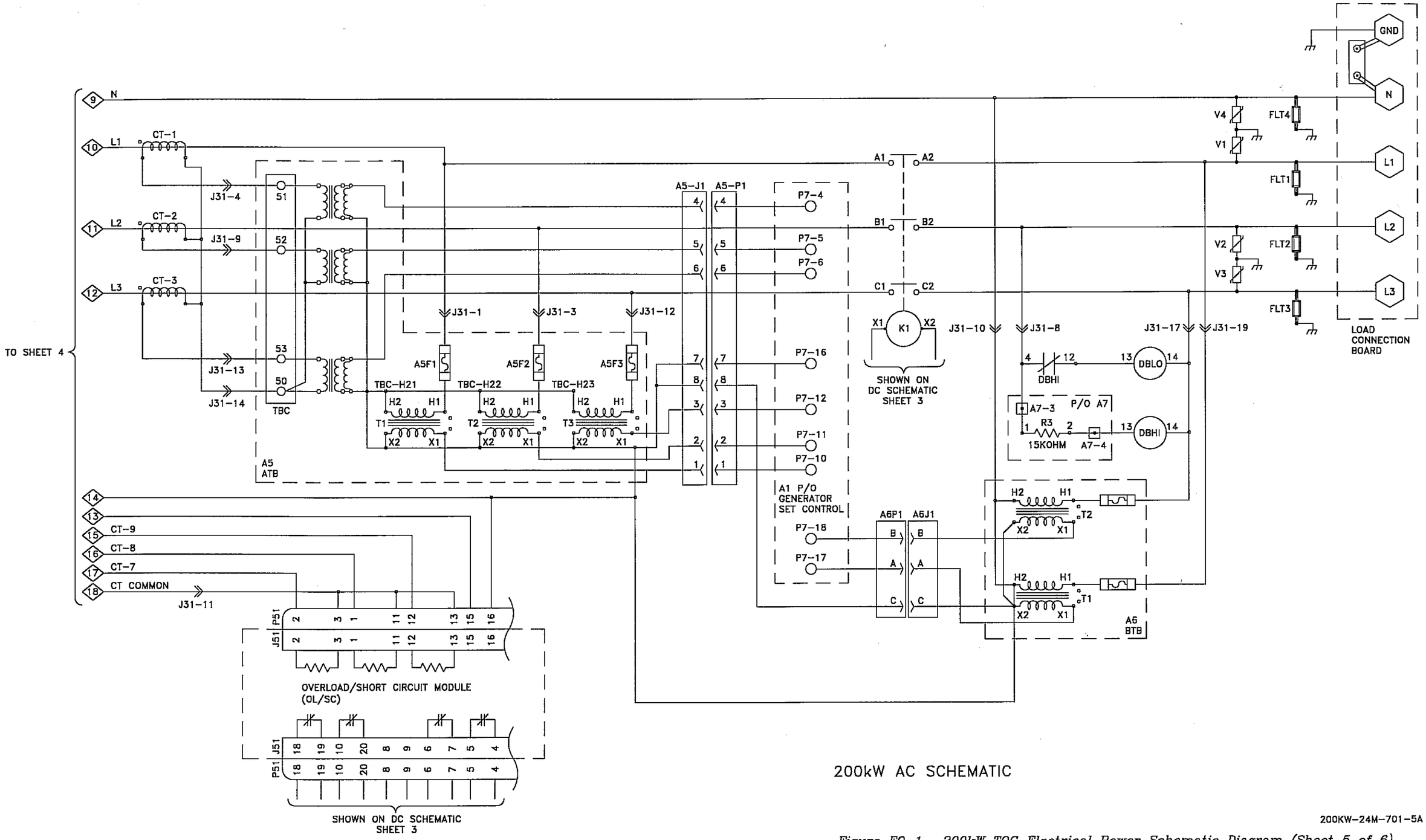
Figure FO-1. 200kW TQG Electrical Power Schematic Diagram (Sheet 3 of 6)



200kW AC SCHEMATIC

200KW-24M-701-4A

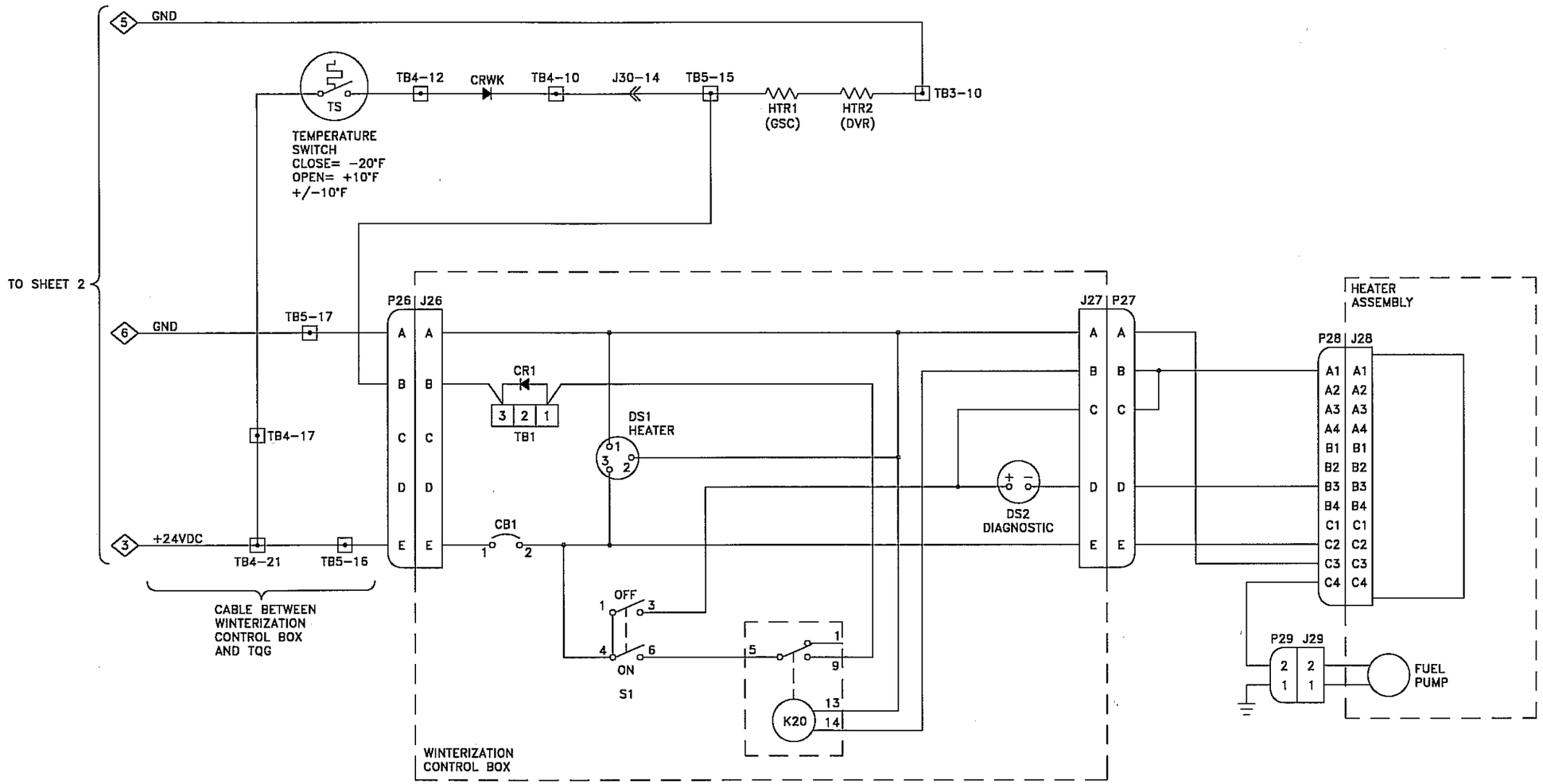
Figure FO-1. 200kW TQG Electrical Power Schematic Diagram (Sheet 4 of 6)



200kW AC SCHEMATIC

200KW-24M-701-5A

Figure FO-1. 200kW TQG Electrical Power Schematic Diagram (Sheet 5 of 6)



WINTERIZATION KIT

200KW-24M-701-6A

Figure FO-1. 200kW TQG Electrical Power Schematic Diagram (Sheet 6 of 6)

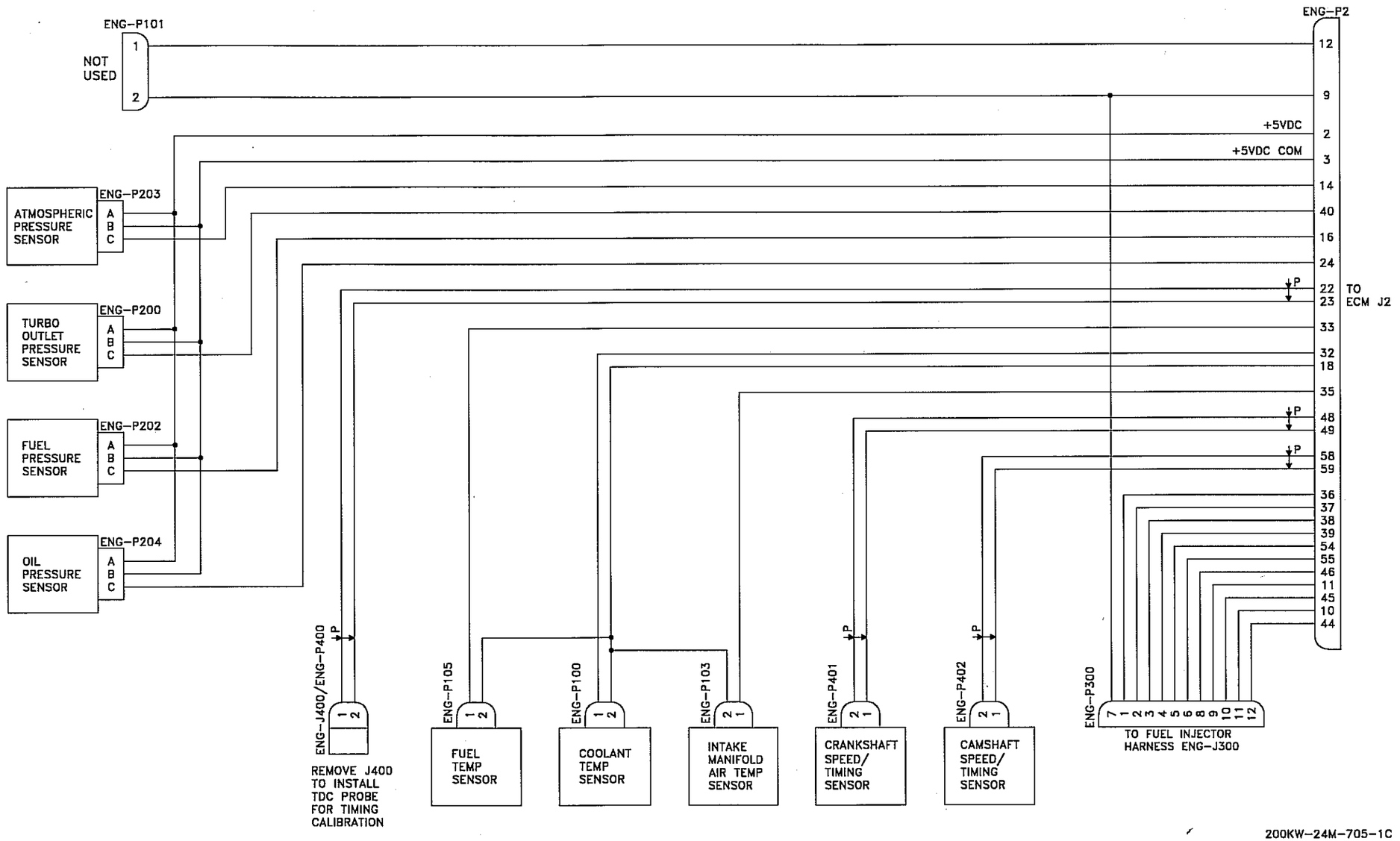
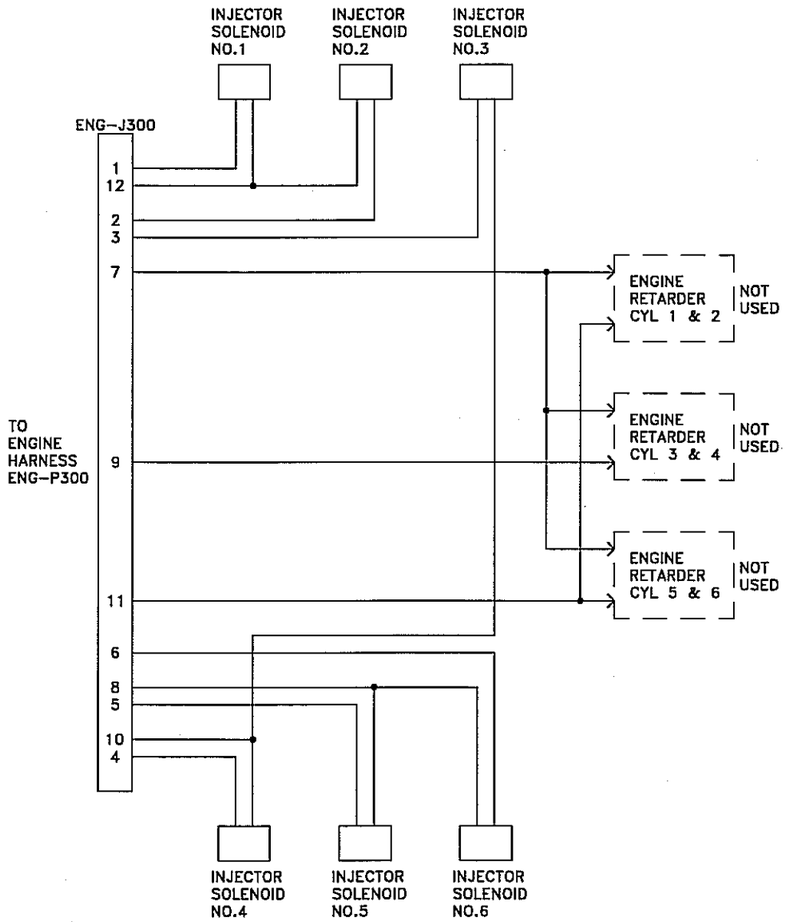


Figure FO-2. 200kW Engine Wiring Harnesses – Schematic Diagram (Sheet 1 of 2)



ENGINE HARNESS TO UNIT INJECTORS

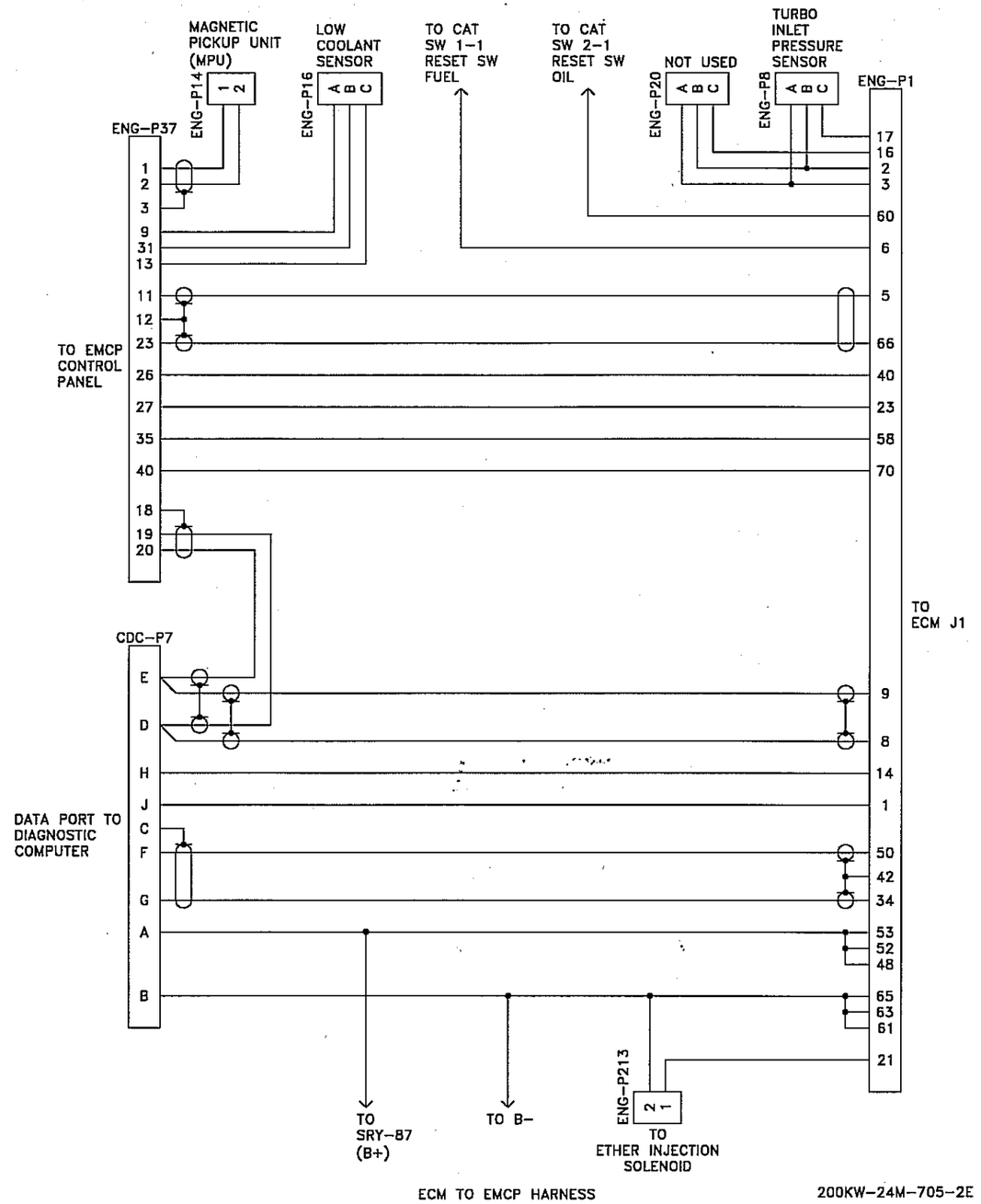
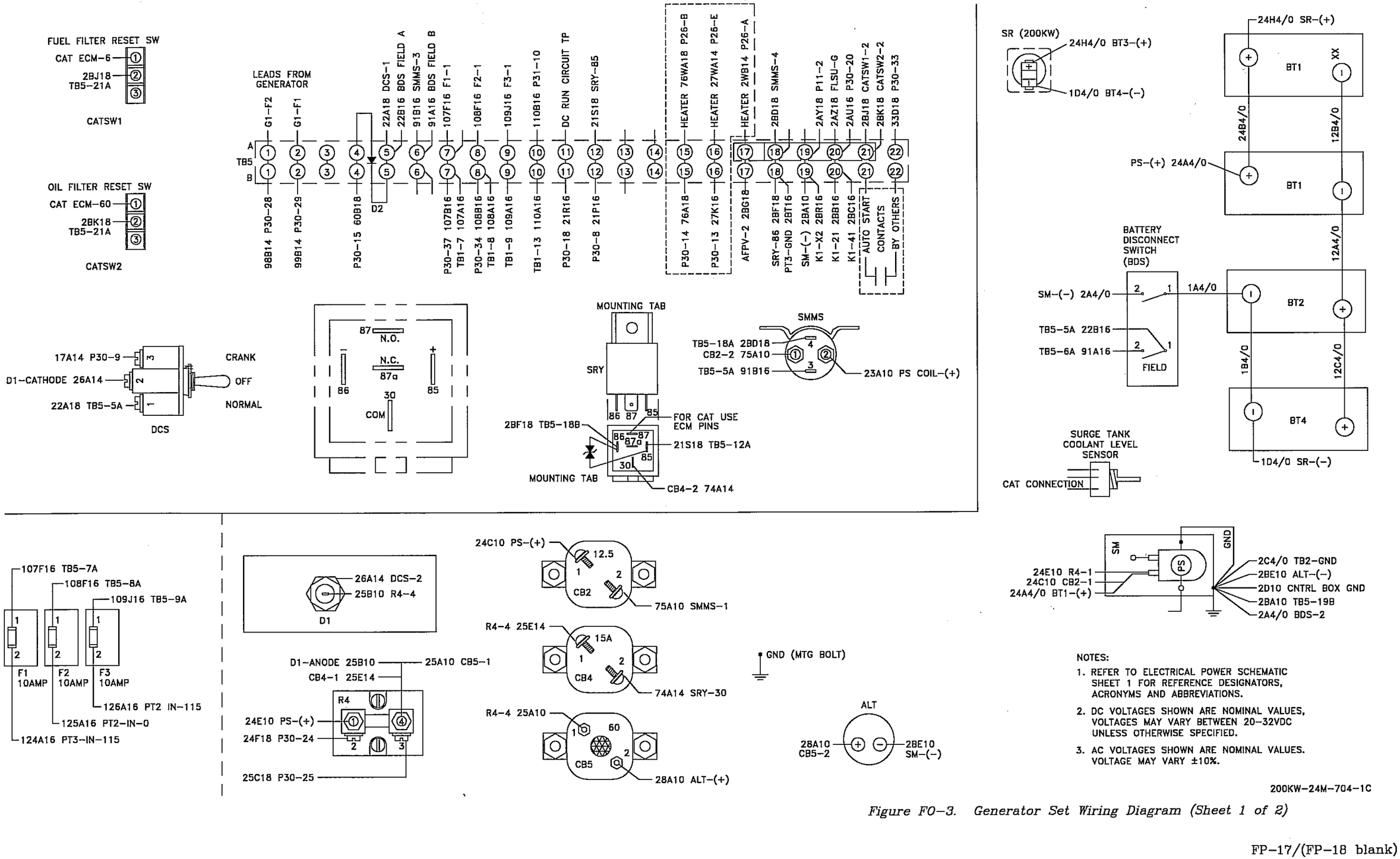


Figure FO-2. 200kW Engine Wiring Harnesses – Schematic Diagram (Sheet 2 of 2)



NOTES:

1. REFER TO ELECTRICAL POWER SCHEMATIC SHEET 1 FOR REFERENCE DESIGNATORS, ACRONYMS AND ABBREVIATIONS.
2. DC VOLTAGES SHOWN ARE NOMINAL VALUES, VOLTAGES MAY VARY BETWEEN 20-32VDC UNLESS OTHERWISE SPECIFIED.
3. AC VOLTAGES SHOWN ARE NOMINAL VALUES. VOLTAGE MAY VARY ±10%.

200KW-24M-704-1C

Figure FO-3. Generator Set Wiring Diagram (Sheet 1 of 2)

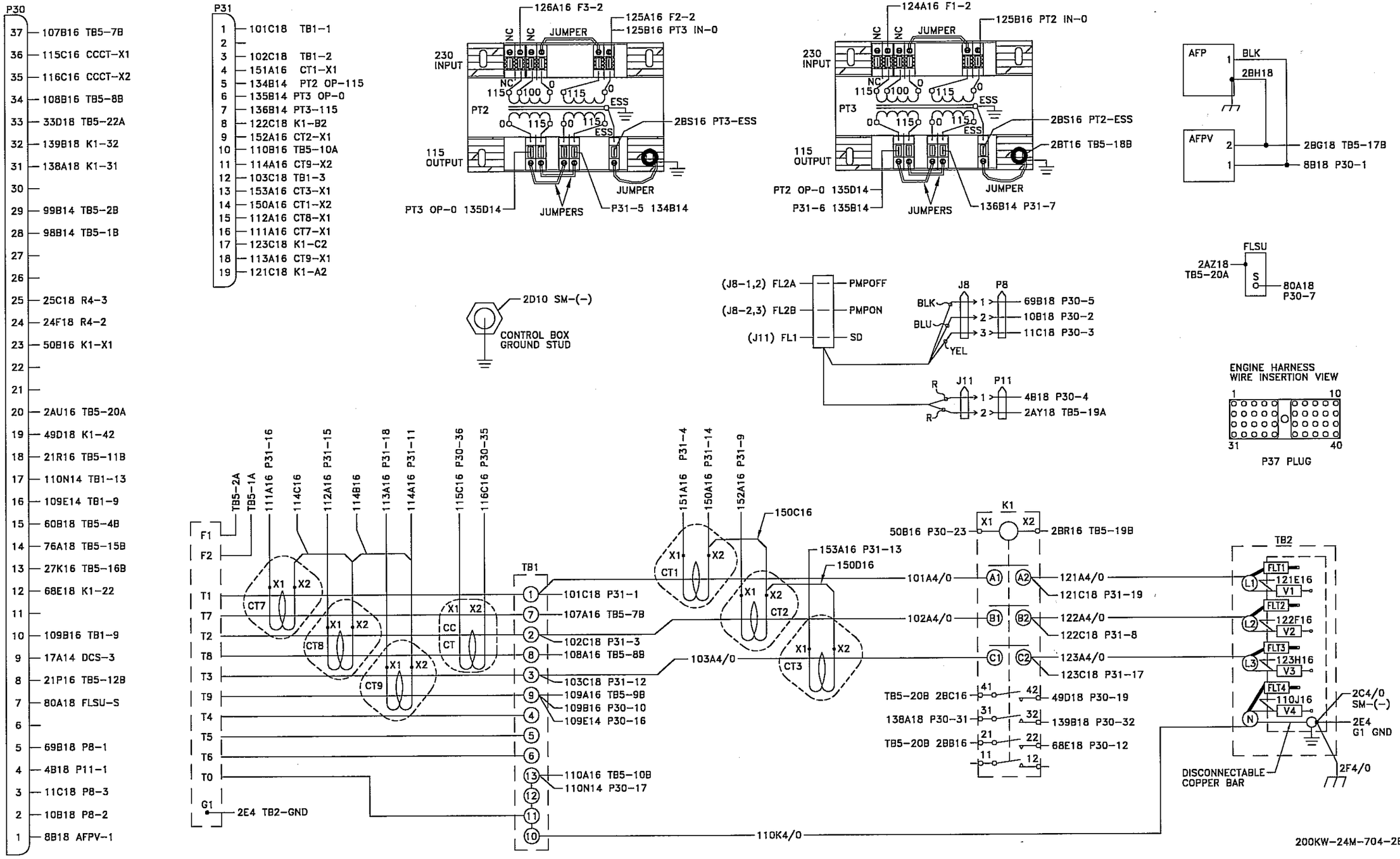


Figure FO-3. Generator Set Wiring Diagram (Sheet 2 of 2)

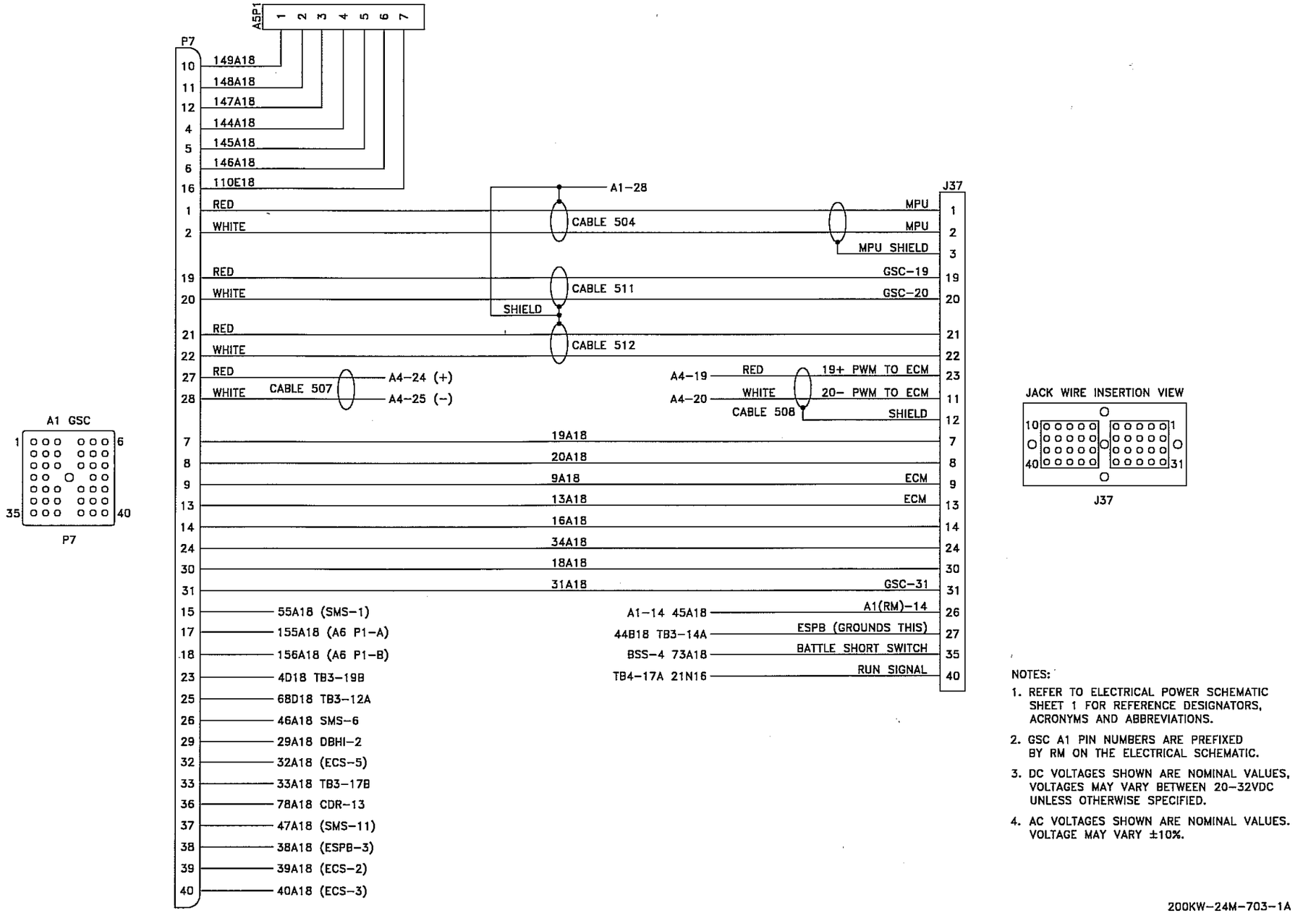


Figure FO–4. Control Box Wiring Diagram (Sheet 1 of 5)

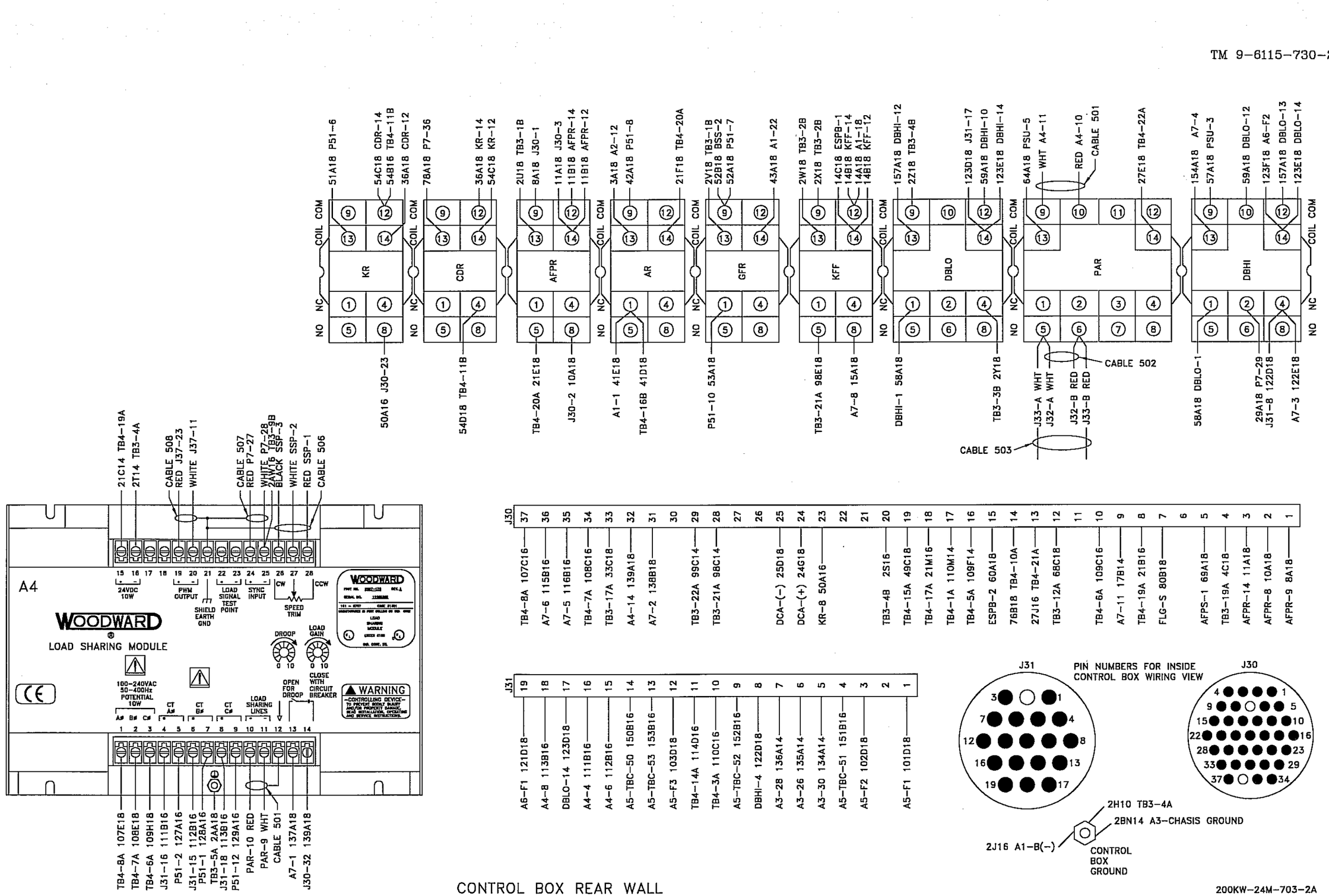
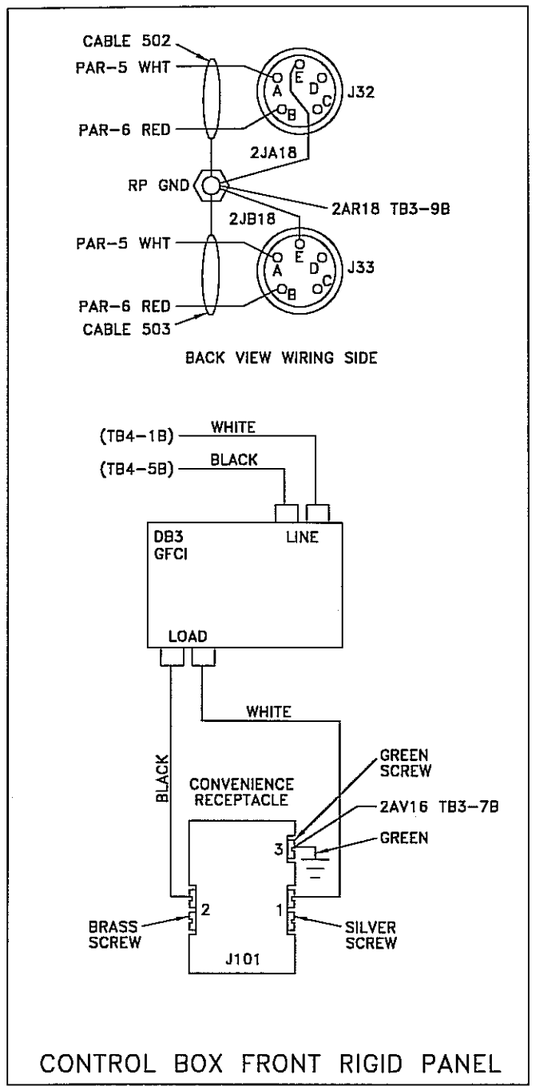
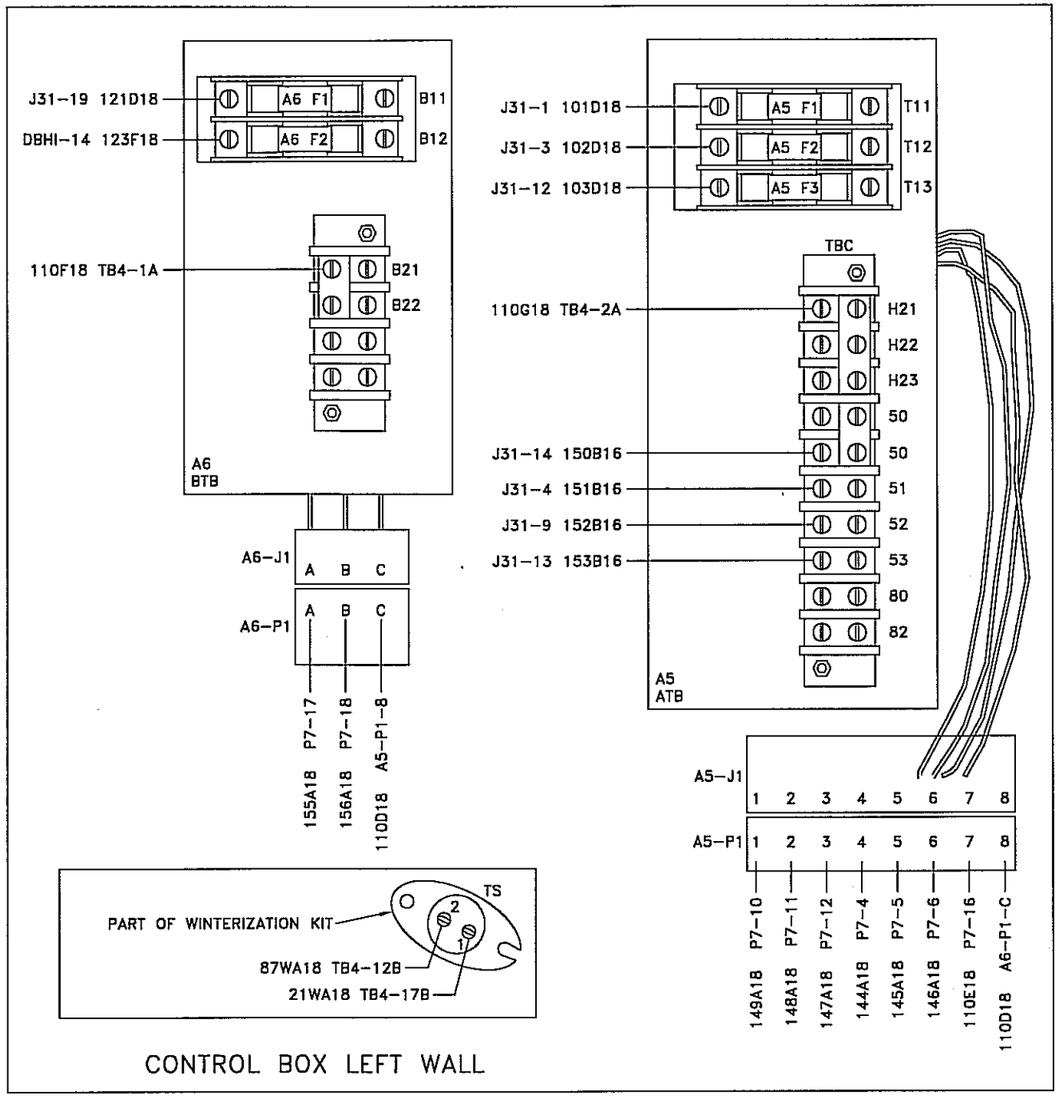
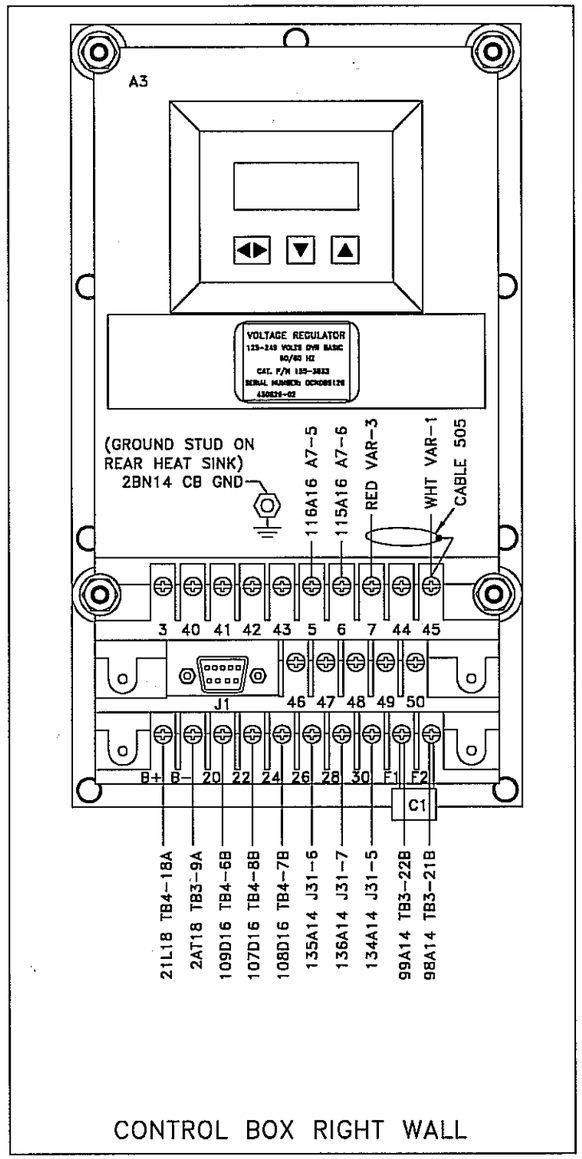


Figure FO-4. Control Box Wiring Diagram (Sheet 2 of 5)



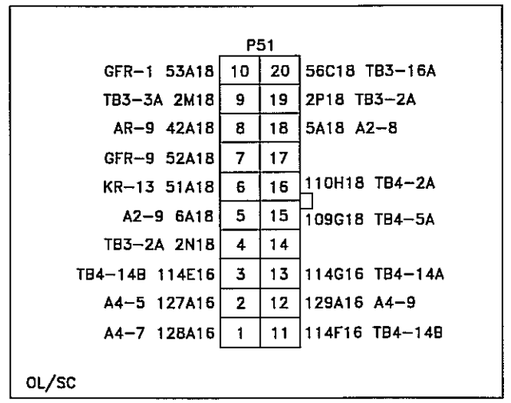


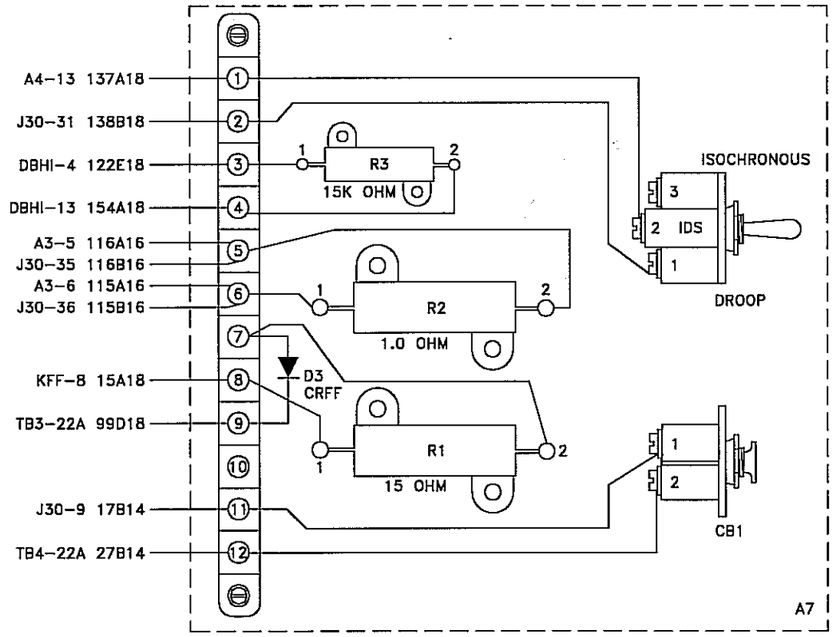


CONTROL BOX FRONT
LEFT AND RIGHT WALLS

200KW-24M-703-3A

Figure FO-4. Control Box Wiring Diagram (Sheet 3 of 5)





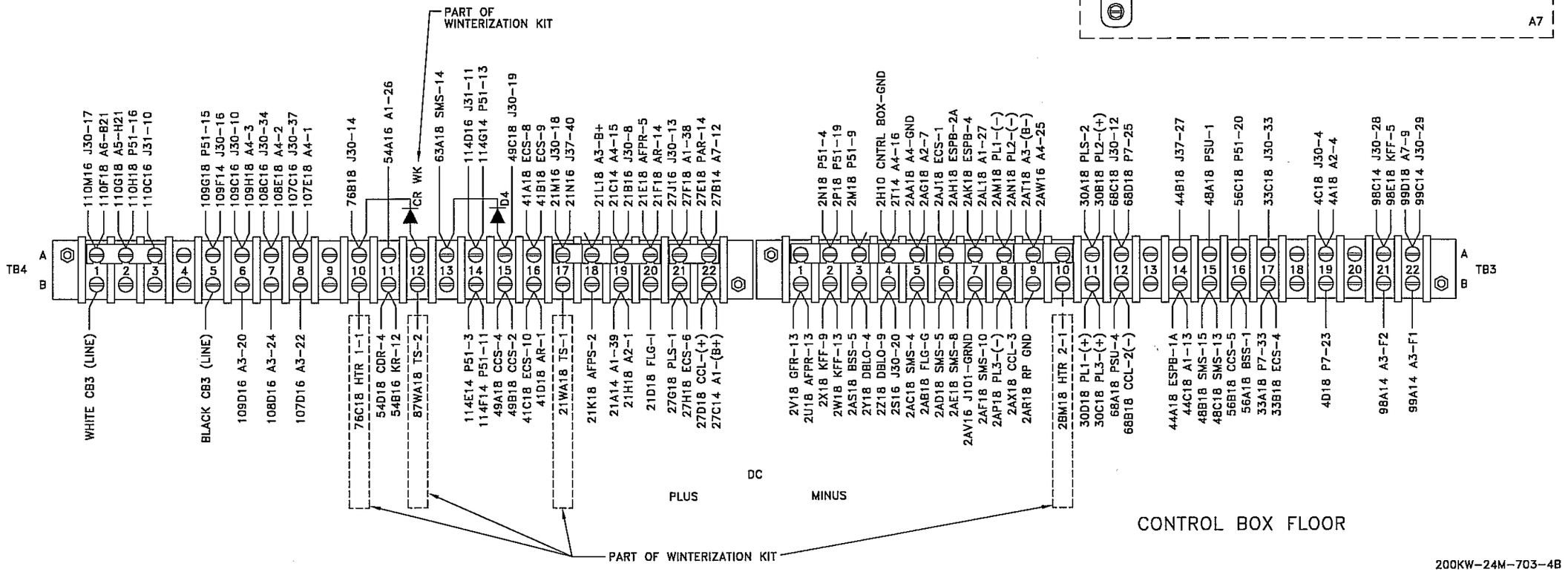


Figure FO-4. Control Box Wiring Diagram (Sheet 4 of 5)

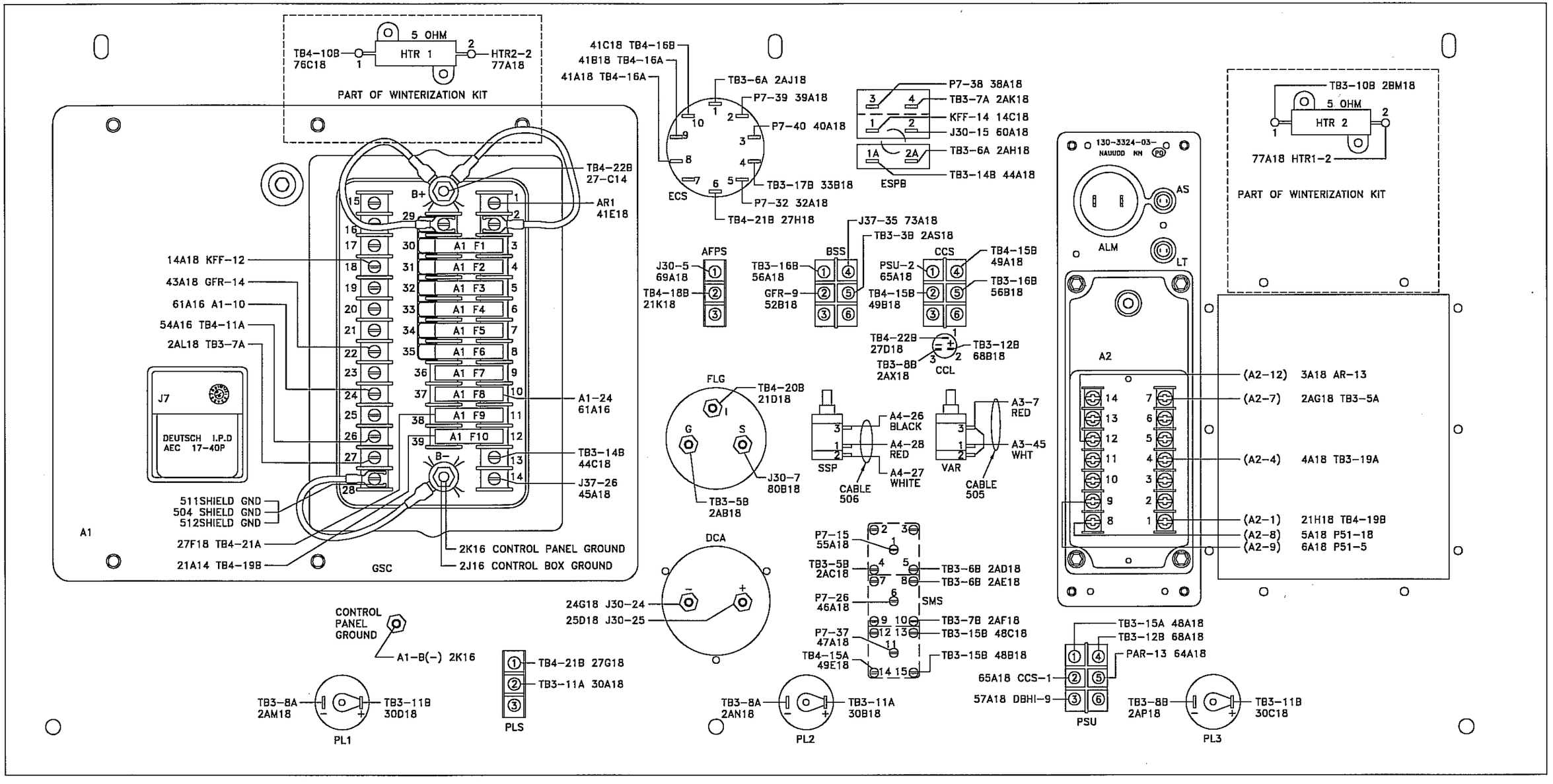


Figure FO-4. Control Box Wiring Diagram (Sheet 5 of 5)

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 Lb.
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

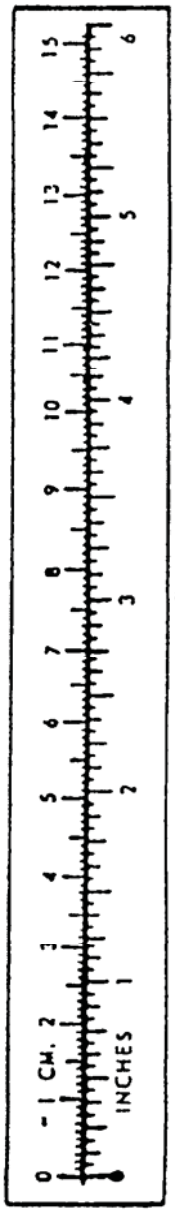
TEMPERATURE

5/9 (°F – 32) = °C
212° Fahrenheit is equivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5 (°C + 32) = °F

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621



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